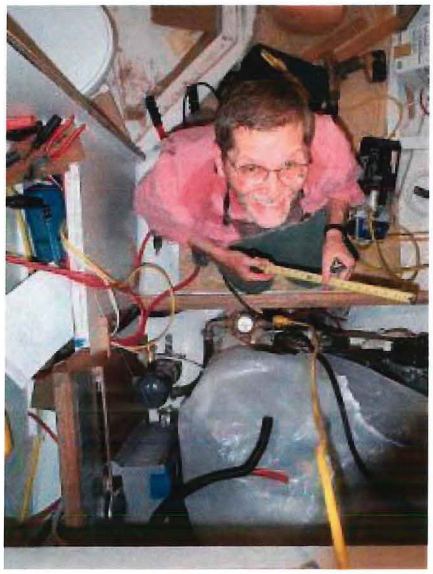
maine innovation index



January 2009

Prepared by:

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MAINE OFFICE OF INNOVATION

STATE OF MAINE
DEPARTMENT OF ECONOMIC
AND COMMUNITY DEVELOPMENT

DECD
Maine Department of Economic and Community Development

JOHN ELIAS BALDACCI
GOVERNOR

JOHN RICHARDSON
COMMISSIONER

January 2009

The *2009 Maine Innovation Index* is the eighth edition of our annual, independent evaluation of our progress on key indicators. This report compares Maine's performance with the United States, the New England states and the other EPSCoR states in order to show our competitive position over time. Using longitudinal data dating back to 1996, the *Index* allows policy makers to see the impact of the renewed investment that Maine has made in innovation over the past twelve years.

This year's data is critical information as we are embarking on a year-long effort to develop a new Science and Technology Action Plan, due in January 2010, which will inform our investments for the next five years.

The importance of innovation in driving Maine's future economic growth cannot be overstated. The Council of Competitiveness, innovation is "the single most important factor in determining America's success through the 21st Century. It will drive productivity, standard of living, and leadership in the global economy."

The *Index* shows that Maine has some areas of strength, and areas where we have improved over time. We outperform our EPSCoR peers on a number of indicators, which is important because these are states like ours which have had to build from a position well behind other states. And, there are areas where we have a lot of work to do.

Given the challenging times we are currently experiencing, Maine's future depends even more on innovation and entrepreneurship on Main Street. The Index is one tool to measure our progress towards these goals.

John Richardson

John Richardson
Commissioner

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INTRODUCTION & SUMMARY

Maine's economy has expanded from its traditional bases of forestry, fishing, agriculture, tourism and manufacturing to include an increasing influence from business, financial and health services; information technologies, biomedical technologies, advanced materials, aquaculture, and advanced manufacturing. Furthermore, Maine's economy, like the global economy, is becoming increasingly driven by entities and individuals that operate at innovative crossroads of these sectors. Maine's future success in growing its economic base and increasing the standard of living of its people lies in the ability of its companies, workers, and citizens to foster this innovation.

The Council of Competitiveness through its National Innovation Initiative describes innovation as the "intersection of invention and insight, leading to the creation of social and economic value."[1] The Information Technology and Innovation Foundation suggests that innovation is "the creation and adoption of new products, services, production processes and business models."[2]

The importance of innovation in driving Maine' future economic growth cannot be overstated. According to the Council of Competitiveness innovation is "the single most important factor in determining America's success through the 21st Century. It will drive productivity, standard of living, and leadership in the global economy,"[3] a thought that is echoed by the Information Technology and Innovation Foundation – "States face a new imperative to boost the competitiveness of their economies not just relative to each other, but to other nations."[4]

The Office of Innovation (OOI) was established within the Department of Economic and Community Development to advance Maine's economic well-being and expand employment opportunities by encouraging and coordinating the State's R&D activities and fostering collaboration among its higher educational and nonprofit research institutions and the business community. It is the responsibility of OOI to regularly plan for and report on progress made by the State in these regards.

Maine's Innovation Index 2009 is a compilation of 25 indicators measuring Maine's economic capacity and progress toward competing in an innovation-driven economy. The indicators are organized into five categories representing key components of an innovation-based economy

- **Research and Development Capacity**
- **Innovation Capacity**
- **Employment & Output Capacity**
- **Education Capacity**
- **Connectivity Capacity**

Research and Development Capacity - Research forms the basis for the successful development of new products, processes and services. The section on research and development (R&D) capacity provides measures of the dollar amount of R&D performance in the state as a percent of gross state product. The measures capture performance (as measured by spending) by the various types of entities engaged in R&D, including industry, academic institutions, and not-for-profit laboratories. Additionally, R&D contributions by the federal government and the state are considered within the R&D capacity section.

Innovation Capacity - Innovation is the continuous process of generating and applying new ideas that lead to commercialization of new products, processes and services. It is this commercialization process that leads to the creation of new jobs and ultimately increased wealth throughout the state. The innovation capacity section of this report assesses Maine's potential for generating innovation by measuring grants obtained through the Federal Small Business Innovation Research program, venture capital attracted, patents issued, and entrepreneurial activity.

Employment & Output Capacity - The depth and breadth of Maine's highly skilled workforce is perhaps the most important indicator of our ability to grow and sustain an innovation-driven economy. For Maine to remain competitive in today's marketplace we need to assure that technology and research-intensive businesses and institutions have a thick labor market of skilled and highly educated workers. With a skilled and knowledge driven labor market, Maine can improve its ultimate economic outcomes: gross state product and per capita income. This section includes the measures of high technology employment and business establishments, science and engineering occupations and PhD's in the workforce, gross state product, and per capita income.

Education Capacity - Maine's economic future will depend heavily on the quality of today's education systems. Since knowledge is the raw material of innovation, our education systems must produce students capable of organizing and analyzing information, communicating effectively, and operating in both collaborative and independent settings. As a state, our success relies on our ability to increase access to a quality, life-long education system for all Maine residents. Over the long-term, it is our education capacity that will serve as the foundation for our employment capacity. Furthermore, technology and innovation based businesses rely on workers with solid foundations in math and science as well as advanced knowledge in science and engineering fields. The education capacity section includes the indicators of science and math skills of 8th grade students, the chance for college by age 19, science and engineering graduate enrollments and degrees awarded, and the percent of population 25 and older with bachelor's degree or more.

Connectivity Capacity - The development and deployment of information technology (IT) has profoundly impacted the way we access and use information, and is defining the way we learn, work, and communicate. The section on connectivity capacity measures Maine's ability to provide IT infrastructure to enable businesses, educators, students and citizens to easily access information. Connectivity capacity indicators include high-speed internet access, household internet connectivity, and K-12 students per internet connected classroom computer.

Within each capacity area there are two types of indicators. The first measures the relative strength of the "raw materials" essential to the growth of Maine's innovation economy. Examples include: R&D spending, education attainment, venture capital investments, and internet connectivity – all necessary inputs that serve as the foundation for innovation-based economic growth. The second type of indicator assesses the performance of Maine's innovation-driven economic growth by measuring key outputs and products. Examples include: patents issued, technology-business establishments, and technology employment. These indicators tell us how Maine's innovation economy is performing and the degree to which inputs are leading to desired outputs and outcomes. In addition to the 25 key indicators, related sub-indicators further describe Maine's performance in growing and sustaining the innovation economy.

In order to assess Maine's performance on the indicators relative to other states and regions, the data for Maine is compared with data for relevant comparison, or reference groups. The reference groups are the U.S. as a whole, the New England states, and the states that are included in the Experimental Program to Stimulate Competitive Research (EPSCoR).[5] The comparison with the U.S. provides the benchmark most commonly used by similar studies that measure a state's performance. The comparison with the New England states allows for an assessment of how well Maine is doing relative to the state's geographic neighbors with whom Maine competes for innovation resources and industry. The comparison with EPSCoR states

provides the most analytically sound benchmark because it compares Maine to states that are similar in terms of their historical performance on R&D indicators. Most of the EPSCoR states are rural and lack a high concentration of industry and related innovation resources.

Table 1 presents a summary of Maine's performance for the 25 primary innovation indicators. It is important to note that for some of the indicators, data for the reference group comparisons and five-year trends is not available. The indicators presented are not meant to be the sole-source, definitive assessment of whether Maine is succeeding in building and sustaining an innovation economy. Like all states, Maine has areas that represent strengths or assets that will serve as the building blocks for the future economy. It also has areas requiring improvement in order for the state to foster innovation, leading to commercialization and economic growth. In many of these areas Maine has made significant progress in the last five years. However, it is clear from several of the indicators that more needs to be done.

Existing areas of strength for Maine in building and sustaining an innovation driven economy - The following are indicators for which Maine's performance ranks it within the top 20 states in the latest year for which data is available:

- High Education Enrollment among Young People – Chance for College by Age 19
- Not-for-Profit Laboratory R&D Performance
- SBIR/STTR Funding
- Math Skills of 8th Grade Students
- Science Skills of 8th Grade Students
- Classroom Connectivity

Areas in which Maine showed improvement during the last five years in building and sustaining an innovation driven economy - The following are indicators for which Maine experienced a trend of improvement during the last five years:

- Total R&D Performance
- Academic R&D Performance
- State R&D Funding
- SBIR/STTR Funding
- Venture Capital Investments
- Ph.D. Scientists and Engineers in the Labor Force
- Per Capita Income
- Math Skills of 8th Grade Students
- Science Skills of 8th Grade Students
- High Education Enrollment among Young People – Chance for College by Age 19
- Science and Engineering Graduate Enrollments
- Science and Engineering Degrees Awarded
- Education Attainment - % of Population 25 and Older with Bachelor's Degree or More
- High Speed Internet Access
- Classroom Connectivity

Areas in which Maine outperforms its EPSCoR peers - Success in economic development does not occur overnight, and Maine, building from a position well behind other states, still has a way to go to successfully compete with the top tier states. However, in several indicators, Maine outperforms its peer states as defined by the EPSCoR program. The following are indicators for which Maine's performance exceeds the EPSCoR states as a whole in the latest year for which data is available:

- Not-for-Profit Laboratory R&D Performance
- SBIR/STTR Funding
- Ph.D. Scientists and Engineers in the Labor Force
- Gross State Product - % Change
- Math Skills of 8th Grade Students
- Science Skills of 8th Grade Students
- High Education Enrollment among Young People – Chance for College by Age 19
- Education Attainment - % of Population 25 and Older with Bachelor's Degree or More
- Household Connectivity
- High Speed Internet Access
- Classroom Connectivity

Existing areas requiring improvement for Maine in building and sustaining an innovation driven economy - The following are indicators for which Maine's performance ranks it within the bottom 20 states in the latest year for which data is available:

- Total R&D Performance
- Industry R&D Performance
- Academic R&D Performance
- Venture Capital Investments
- Patents Issued
- Entrepreneurial Activity
- High Technology Employment - % Change
- High Technology Business Establishments - % Change
- S&E Occupations in the Workforce
- Gross State Product - % Change
- Per Capita Income
- Science and Engineering Graduate Enrollments
- Science and Engineering Degrees Awarded
- Education Attainment - % of Population 25 and Older with Bachelor's Degree or More
- High Speed Internet Access

TABLE 1 - MAINE INNOVATION INDEX 2009 – INDICATOR PERFORMANCE SUMMARY				
INDICATOR	**Maine 1-Year Trend**	**Maine 5-Year Trend**	**Maine Compared to EPSCoR Most Current Year**	**Maine Latest Year National Rank 1-51 with 1=best; (year)**
RESEARCH AND DEVELOPMENT CAPACITY				
Total R&D Performance	↑	↑	↓	**35** (2005)
Industry R&D Performance	↓	↔	↓	**38** (2006)
Academic R&D Performance	↑	↑	↓	**42** (2006)
Not-for-Profit Laboratory R&D Performance	↓	↓	↑	**3** (2005)
Federal R&D Obligations	↑	↓	↓	**25** (2005)
State R&D Investments	↑	↑	**N/A**	**N/A**
INNOVATION CAPACITY				
SBIR/STTR Funding	↑	↑	↑	**8** (2006)
Venture Capital Investments	↓	↑	↓	**38** (2007)
Patents Issued	↓	↓	↓	**43** (2007)
Entrepreneurial Activity	↓	**N/A**	↔	**31** (2007)
EMPLOYMENT & OUTPUT CAPACITY				
High Technology Employment - % Change	**N/A**	**N/A**	↓	**31** (2007)
High Technology Business Establishments - % Change	**N/A**	**N/A**	↓	**35** (2007)
S&E Occupations in the Workforce	**N/A**	**N/A**	↓	**44** (2006)
Ph.D. Scientists and Engineers in the Labor Force	↑	↑	↑	**28** (2006)
Gross State Product - % Change	**N/A**	**N/A**	↑	**39** (2007)
Per Capita Income	↑	↑	↓	**36** (2007)

TABLE 1 - MAINE INNOVATION INDEX 2009 – INDICATOR PERFORMANCE SUMMARY				
INDICATOR	**Maine 1-Year Trend**	**Maine 5-Year Trend**	**Maine Compared to EPSCoR Most Current Year**	**Maine Latest Year National Rank 1-51 with 1=best; (year)**
EDUCATION CAPACITY				
Math Skills of 8th Grade Students	N/A	↑	↑	**12** (2007)
Science Skills of 8th Grade Students	N/A	↔	↑	**9** (2005)
Higher Education Enrollment among Young People – Chance for College by Age 19	N/A	↑	↑	**13** (2006)
Science and Engineering Graduate Enrollments	↔	↑	↓	**51** (2006)
Science and Engineering Degrees Awarded	↑	↑	↓	**38** (2006)
Education Attainment - % of Population 25 and Older with Bachelor's Degree or More	↓	↑	↑	**33** (2008)
CONNECTIVITY CAPACITY				
Household Connectivity[6]	N/A	N/A	↑	**30** (2007)
High Speed Internet Access	↑	↑	↑	**37** (2006)
Classroom Connectivity	↑	↑	↑	**2** (2006)

Ranking is among all states plus District of Columbia, 1-51 with 1=best. Latest year is in parentheses.

Key: ↑ = Improving Trend or Higher
↓ = Decreasing or Lower
↔ = No Change or Equal
N/A = Not Applicable or Data Not Available

Endnotes

1 *Innovate America,* Council of Competitiveness, 2004

2 *The 2008 State New Economy Index,* The Information Technology and Innovation Foundation, 2008

3 see endnote 1

4 See endnote 2

5 EPSCoR focuses on those states that have historically received lesser amounts of federal R&D funding and have demonstrated a commitment to develop their research bases and to improve the quality of science and engineering research conducted at their universities and colleges. The program currently operates in 23 states: Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, and Wyoming, as well as the Commonwealth of Puerto Rico and the U.S. Virgin Islands. This description is from the EPSCoR Web site at: www.epscorfoundation.org/WhatIsEPSCoR.htm

6 Data is from a different source than previous years and therefore is not compatible for comparison with data presented in previous years of the Maine Innovation Index.

indicators:

- Total R&D Performance
- Industry R&D Performance
- Academic R&D Performance
- Not-for-Profit Laboratory R&D Performance
- Federal R&D Obligations
- State R&D Investments

RESEARCH & DEVELOPMENT CAPACITY OVERVIEW

Research and development (R&D) is a driving force in economic growth. It fuels innovation that leads to new products, processes, technologies, and services. These innovations spawn new industries, new jobs, and ultimately, an improved quality of life. R&D activity also attracts and supports a highly educated and skilled workforce which in turn continues to build a cycle of innovation.

In the last ten years, Maine has made notable progress on building R&D capacity and performance. In 1997, Maine ranked 49th among all states in total R&D as a percent of gross state product (GSP). **In 2005, the latest year for which comparable data is available, Maine improved its ranking to 35th.** In terms of R&D performance by sector, Maine ranks high in not-for-profit R&D nationally (ranking 3rd highest nationally in terms of R&D performed as a percent of GSP), and lower in terms of industry and academic R&D. The state is making progress in academic R&D. In 2002 Maine ranked 49th in academic R&D as a percent of GSP but improved to 43rd in 2006. With regard to industry R&D Maine has not progressed. In 2001 Maine ranked 35th in industry R&D as a percent of GSP. It improved in 2005 but in 2006 decreased to a ranking of 38th.

Maine's improvement in R&D capacity is by design. In the early 1990's, Maine invested very little in R&D with annual funding levels below $3 million. Since 2000, Maine has maintained annual R&D investment levels in excess of $20 million with peaks occurring in 2003-04 and 2007-08, due in part to the passage of major bonds for R&D.

Most of the R&D performance indicators in this section are expressed as a percentage of GSP. This provides a measure of both the intensity of R&D in the state (How much is occurring?) and the importance of R&D to the economy (What is its impact?). GSP is also the most accurate way of comparing R&D investments in Maine to other states and the nation. In order to assess Maine's performance relative to other geographic areas, the R&D indicators in this section are presented in comparison to three reference groups. They are the U.S. as a whole, New England, and states that are part of The Experimental Program to Stimulate Competitive Research (EPSCoR).

These indicators attempt to present the most complete picture of R&D funding in Maine, but they are limited by the availability of data. For example, nationwide data on state investments in R&D are not available; likewise, figures for R&D spending by not-for-profit laboratories reflect only their federal sources of funding.

Total R&D Performance

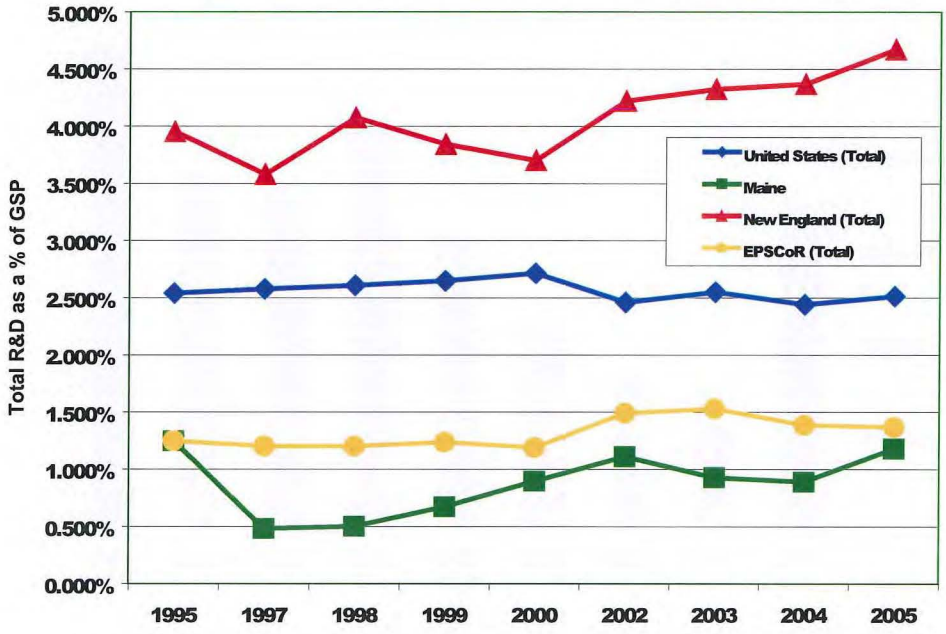
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	35

Summary

In 2005, total R&D performance in Maine represented 1.18 percent of GSP compared to 2.51 percent for the U.S., 4.67 percent for New England, and 1.37 percent for the EPSCoR states. While Maine lags the reference groups on this indicator, the state has been making progress and is near the average of other EPSCoR states for the first time since 1995[1]. **In 1997 Maine ranked 49th among all states in total R&D as a percent of gross state product (GSP). In 2005, the latest year for which comparable data is available, Maine improved its ranking to 35th.**

Total R&D Spending as a Percent of Gross State Product – 1995-2005



Note: From 1997-2000 & 2002-2005 chart portrays one-year increments; all other years are in two-year increments.

Why This Is Significant

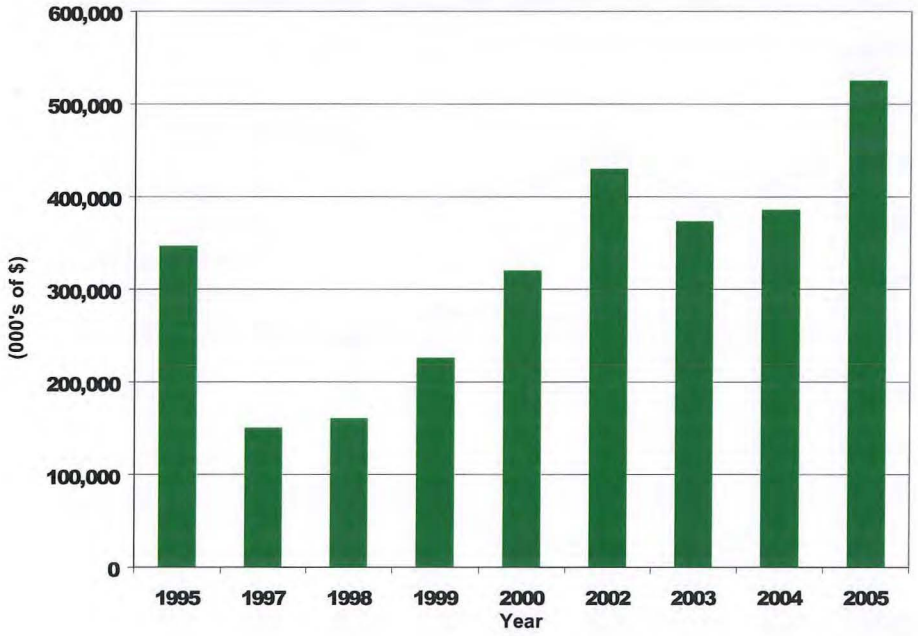
An innovation economy requires investments in research and development to generate the knowledge and discoveries that lead to new commercial products and services. Such research is conducted by industry, academia, not-for-profit laboratories, and government. This indicator is the most comprehensive measure of R&D capacity in Maine and captures all available sources of comparable state data. Expressing R&D expenditures as a percent of gross state product measures both the impact of R&D on the economy and the intensity of R&D that is occurring.

Related

In 2005, total R&D performed reached $524 million in Maine. This represented an increase of 36.3 percent from the 2004 level of $384.4 million. Between 2000 and 2005 total R&D performed in Maine increased 64.4 percent compared to 50.4 percent for New England, 51.9 percent among the EPSCoR states and 17.2 percent for the U.S. as a whole. Between 2004 and 2005, the latest two years for which comparable state data is available, Maine (at 36.3 percent) experienced a significantly higher growth rate in total R&D than the U.S (9.4 percent) as a whole, the EPSCoR states (5.9 percent), and the New England region (11.4 percent).

In terms of the sectors contributing to R&D performance, Maine has a higher percentage of R&D performed by the

Total R&D Spending in Maine – 1995-2005

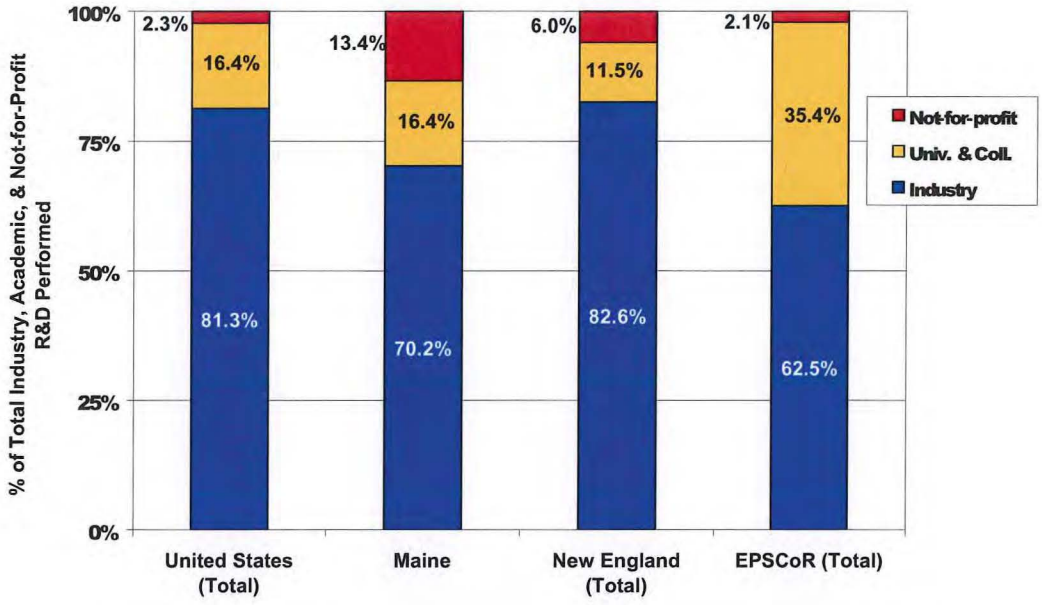


Note: From 1997-2000 & 2002-2005 chart portrays one-year increments; all other years are in two-year increments.

not for profit sector than any of the reference groups. This pattern reflects the significance of Jackson Laboratories, and Maine's leading medical and marine institutions, in the state's R&D portfolio. Out of R&D performed by the three major sectors (industry, academic, and not for profit) in 2005, 13.4 percent of R&D performed was by the not for profit sector in Maine. This compares to 2.3 percent in the U.S. as a whole, 6.0 percent among New England states, and 2.1 percent among EPSCoR states. In contrast however, in 2005, Maine had a lower percentage of industry R&D being performed with a level of 70.2 percent compared to 81.3 percent for the U.S. and 82.6 percent for New England states. Maine came in above the EPSCoR states as a whole, which was 62.5 percent.

Sources

R&D by Performance Sector – 2005



Note: not for profit includes only that which is federally funded and therefore the contribution by this sector is understated

Total R&D spending[2] is from National Science Foundation/Division of Science Resources Statistics; National Patterns of R&D Resources 2005 Data Updates, derived from four NSF surveys: Survey of Industrial R&D; Survey of R&D Expenditures at Universities and Colleges, Survey of Federal Funds for R&D, and Survey of R&D Funding and Performance by Nonprofit Organizations; http://www.nsf.gov/statistics. Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/. 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification.

Industry R&D Performance

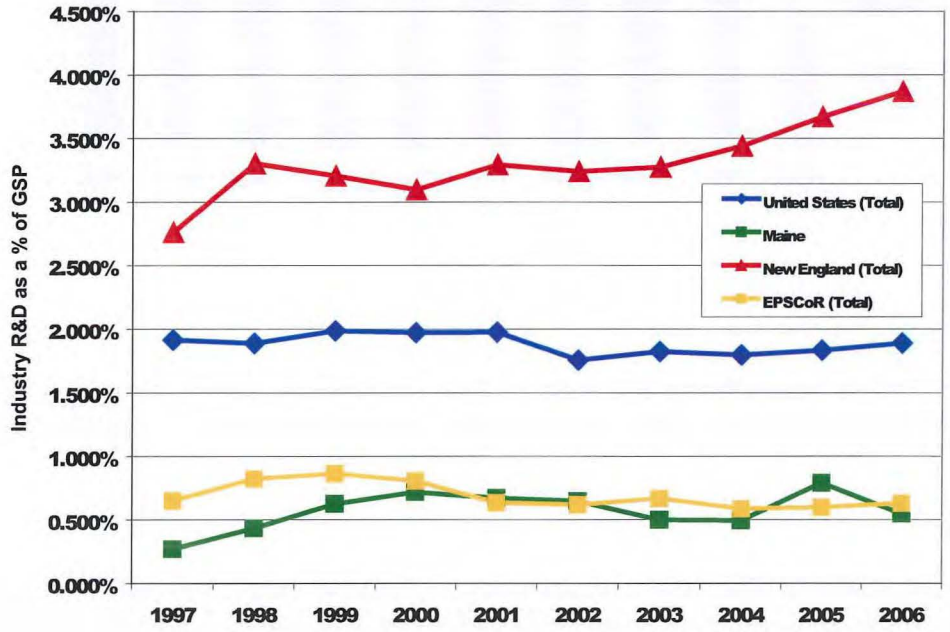
— performance summary —

Maine 1-Year Trend	↓
Maine 5-Year Trend	↔
Maine Compared to EPSCoR	↓
Maine's National Ranking	38

Summary

After an increase in industry R&D capacity in 2005, Maine dropped to $253 million in 2006, a decrease of 27.7 percent from the 2005 level of $350 million[3]. In 2006, industry R&D in Maine represented 0.55 percent of gross state product (GSP). This was slightly lower than the EPSCoR level of 0.63 and more significantly lower than the U.S. at 1.89 and New England at 3.87. Maine's decrease on this indicator moved it from ranking 32nd in the nation in 2005 to 38th in 2006.

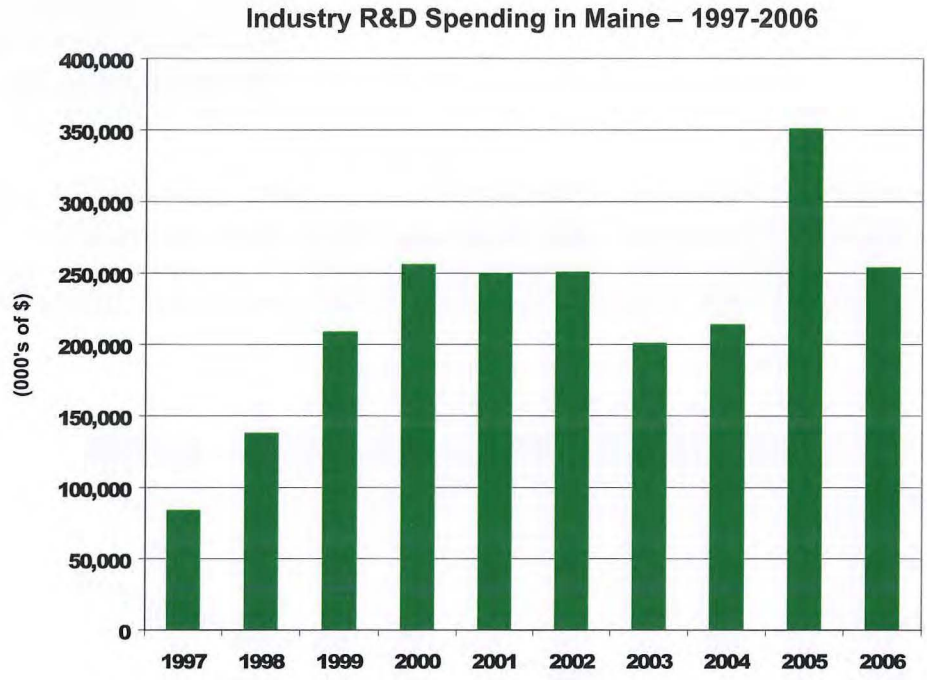
Industry R&D Spending as a Percent of GSP – 1997-2006



Why This Is Significant

This indicator measures Maine's private sector investments in innovation. Industry R&D comprises the vast majority of the nation's total R&D investments, and is considered to be an indicator of where industry is willing to reinvest its knowledge base and build a competitive advantage. Industry R&D drives state economic growth by creating high paying jobs for the performance of R&D, increasing productivity, and generating new products and services. Industry R&D is particularly important for transforming and growing Maine's economy, which has been historically reliant on traditional, natural resource-based industries. R&D can both strengthen these industries as well as create opportunities for new industries in the state.

INDUSTRY R&D PERFORMANCE



Related

In 2006, industry R&D in Maine equaled $253 million. This was a drop of almost $100 million from the previous year and was a small increase from five years previous in 2002 when industry R&D was slightly under $250 million.

Sources

Industry R&D performance is from U.S. Business R&D Expenditures Increase in 2006; Companies' Own and Federal Contributions Rise [August 2008] http://www.nsf.gov/statistics/infbrief/nsf08313/ Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/. 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification.

Academic R&D Performance

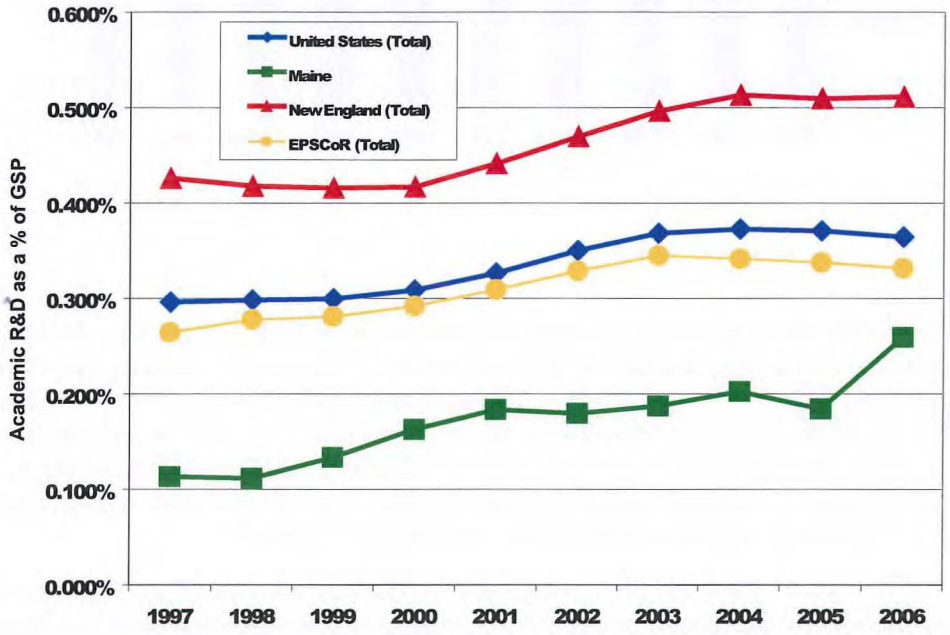
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	42

Summary

In 2006, R&D performed at academic institutions in Maine equaled $120 million, which was a 47 percent increase from the 2005 level. While Maine still lags the benchmark groups including the EPSCoR states, the state has made ground on this indicator. In 2006 R&D performed at Maine academic institutions represented 0.26 percent of GSP compared to 0.36 percent in the U.S. as a whole, 0.51 percent among New England states, and 0.33 percent for all EPSCoR states combined. Between 2002 and 2006 growth in academic R&D in Maine equaled 73 percent outpacing the growth experienced on average in the U.S and New England (31 percent), and the EPSCoR states (33 percent).

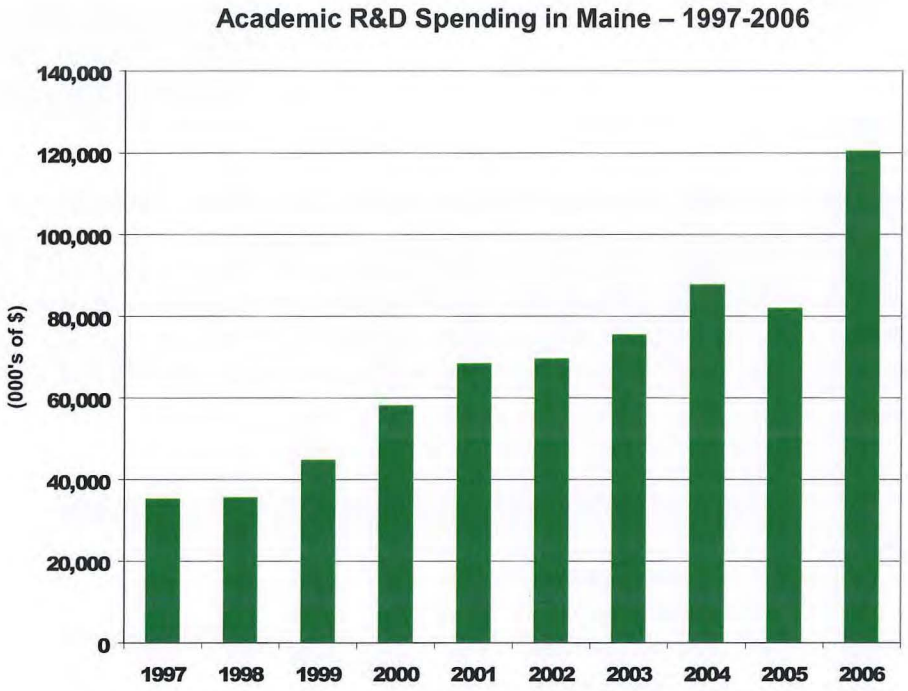
Academic R&D Spending as a Percent of GSP – 1997-2006



Why This Is Significant

Universities and colleges are a major source of knowledge and research. In this knowledge-based economy, businesses increasingly seek to develop partnerships with research-oriented universities and colleges to develop and test innovative products and services. A healthy economy also benefits from knowledge workers that begin their advanced learning and research experiences at universities and colleges. This requires investments in R&D at universities and colleges. This indicator reflects the capacity of Maine universities and colleges to conduct R&D and contribute to knowledge-based economic development.

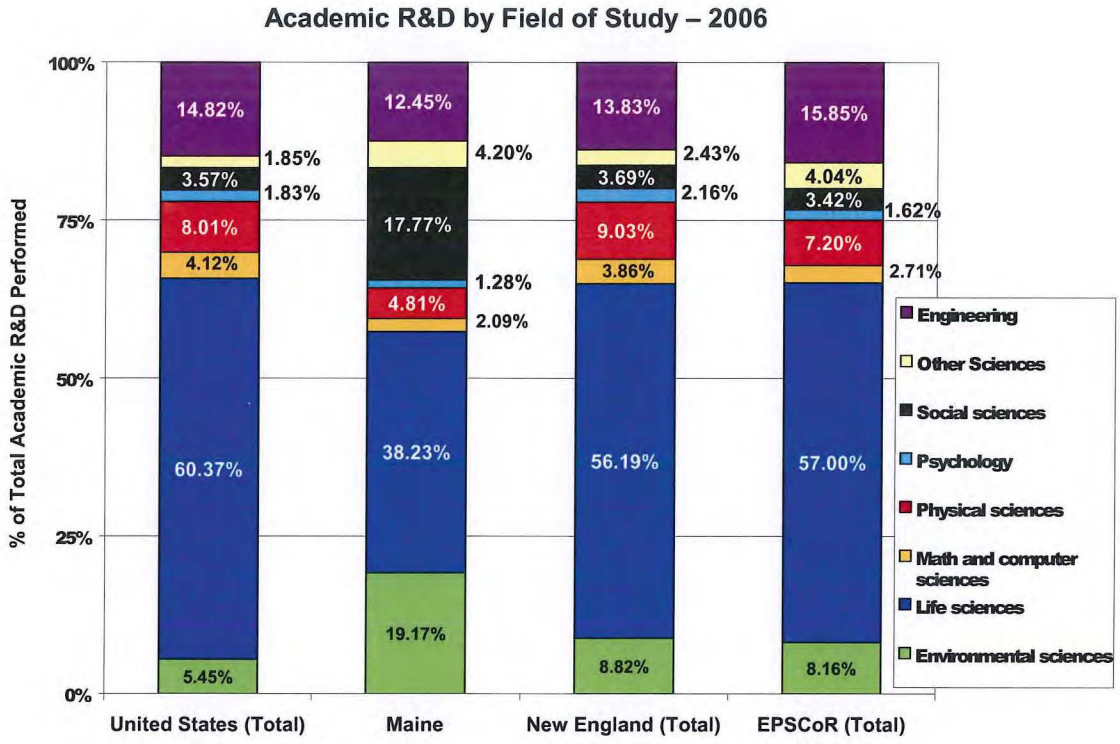
ACADEMIC R&D PERFORMANCE



Related

In 2006 38.2 percent of all R&D performed by academic institutions in Maine was within the life sciences field.[4] This was the largest field of study for academic-performed R&D in Maine. Life sciences include the fields of agricultural, biological, and medical sciences; and environmental sciences include the fields of atmospheric sciences, earth sciences, and oceanography. Environmental sciences followed at 19.2 percent and then social sciences at 17.8 percent. These three areas accounted for 75 percent of academic-performed R&D in Maine in 2006. Percentages for other fields of study for academic-performed R&D in Maine in 2006 included engineering at 12.5 percent, physical sciences at 4.8 percent, and math and computer sciences at 2.1 percent.

In comparison to the reference group, in 2006 Maine had a greater concentration of academic performed R&D in the fields of environmental and social sciences and a lower concentration in the field of life sciences.



Sources

Academic R&D performance data is from National Science Foundation/Division of Science Resources Statistics; Survey of R&D Expenditures at Universities and Colleges 2006; http://www.nsf.gov/statistics. Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/. 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification

Not-for-Profit Laboratory R&D Performance[6]

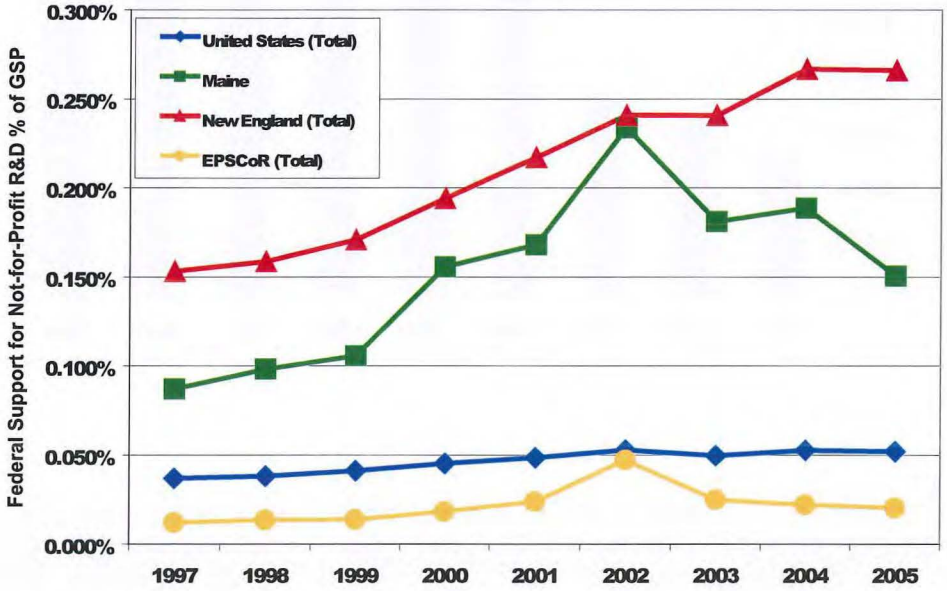
— performance summary —

Maine 1-Year Trend	↓
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↑
Maine's National Ranking	3

Summary

Maine continues to be a national leader in R&D performed by not-for-profit research laboratories, however the trend indicates the state's competitive advantage is declining. From 1995 to 2002, R&D performed at Maine's not-for-profit research labs from federal sources of funding grew dramatically, from 0.084 percent in 1995 reaching 0.234 percent of GSP in 2002. In 2003 Maine's level dropped to 0.181 percent and increased slightly to 0.188 percent in 2004 but then dropped to 0.150 for 2005. Even with this decrease, Maine remained significantly above the level of the nation as a whole at 0.052 percent and the EPSCoR states combined at 0.020 percent of GSP. The New England level in 2005 was 0.266 percent, remaining above the Maine level.

Federal Support for Not-for-Profit R&D Spending
Percent of GSP – 1997-2005

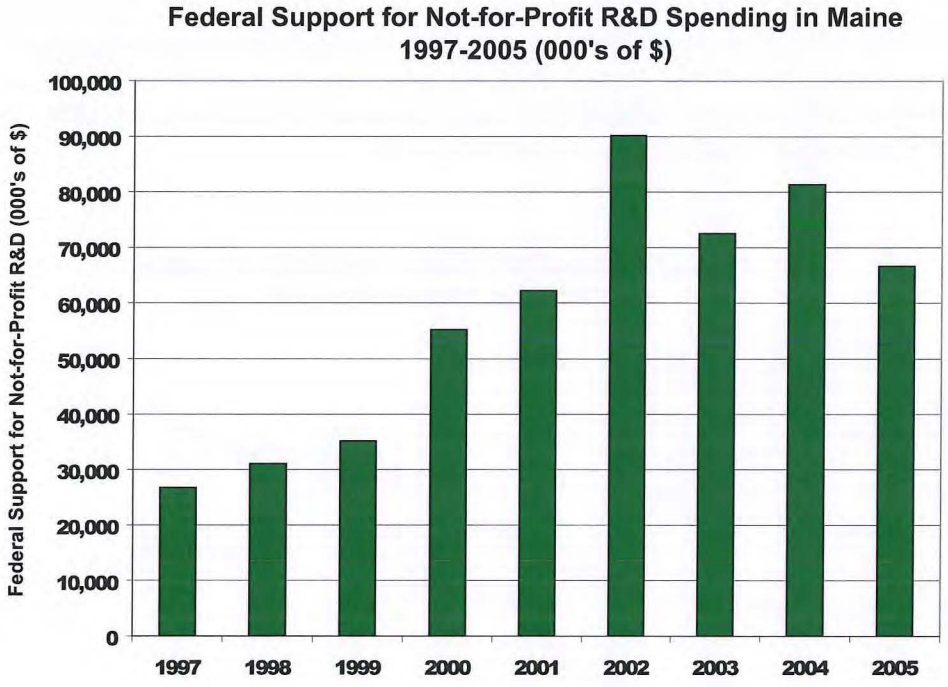


Why This Is Significant

Maine has a robust and economically important not-for-profit research sector. In Maine this sector includes the institutions of Bigelow Laboratory for Ocean Sciences, Foundation for Blood Research, Gulf of Maine Research Aquarium, Jackson Laboratory, Maine Medical Center Research Institute, Mount Desert Island Biological Laboratory, Maine Institute for Human Genetics and Health, and the Wells National Estuarine Research Reserve. This is significant because Maine has historically lacked private academic institutions, such as a medical school, that focus on R&D. The not-for-profit institutions are involved in various partnerships with the University of Maine which helps increase Maine's overall R&D capacity. Taken together, Maine's not for profit research labs and academic institutions contribute significantly to both R&D performance and the development of students and talent.

Related

In terms of absolute dollars, federal funding for not-for-profit R&D performance in Maine increased from $23 million in 1995 to more than $81 million in 2004, but decreased to a little less than $67 million in 2005, a decrease of 18.1 percent from 2005.



Sources

1987-2001 not-for-profit R&D performed is from National Science Foundation/Division of Science Resources Statistics; National Patterns of R&D Resources 2002 Data Update, derived from Survey of R&D Funding and Performance by Nonprofit Organizations; 2002-2005 is from National Science Foundation/Division of Science Resources Statistics, Survey of Federal Funds for Research and Development: Fiscal Years 2002, 2003, 2004, and 2005; http://www.nsf.gov/statistics. Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/. 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification.

Federal R&D Obligations

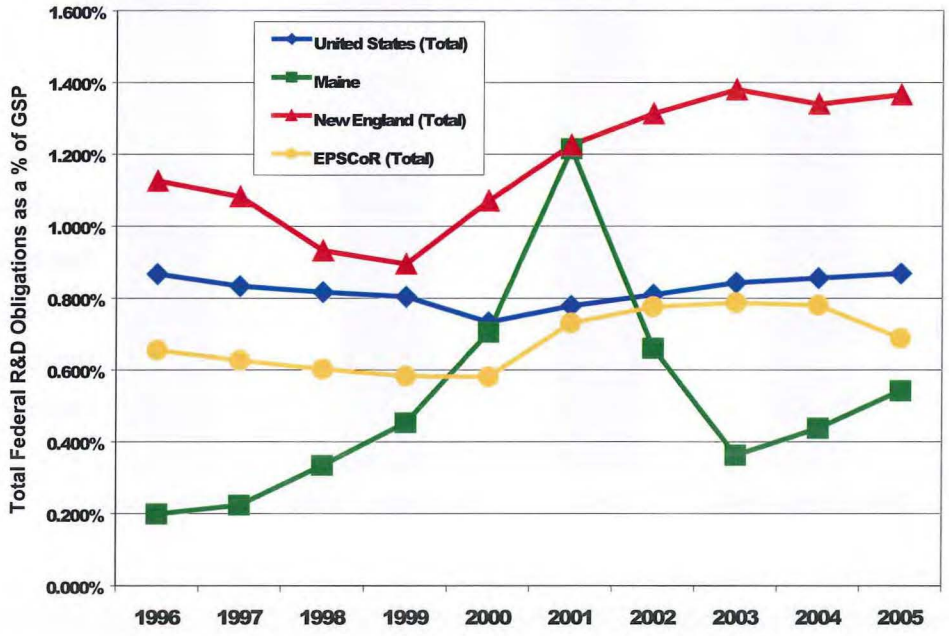
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↓
Maine's National Ranking	25

Summary

Between 1995 and 2001, Maine experienced significant increases in federal funding for R&D to a point where the state caught up with the reference groups on this indicator.[7] During this period federal funding for R&D in Maine increased from 0.19 percent of gross state product (GSP) to 1.21 percent. However from 2001 to 2003, Maine experienced a drop on this indicator to a level of 0.36 percent of GSP. Since then, Maine has seen some recovery in 2004 with a level of 0.44 percent and in 2005 with a level of 0.54 percent. Even with this recent increase, Maine still falls below the average of the U.S. as a whole (0.87 percent), the New England level (1.36 percent), and the EPSCoR level (0.69 percent).

Total Federal R&D Obligations as a Percent of GSP – 1996-2005



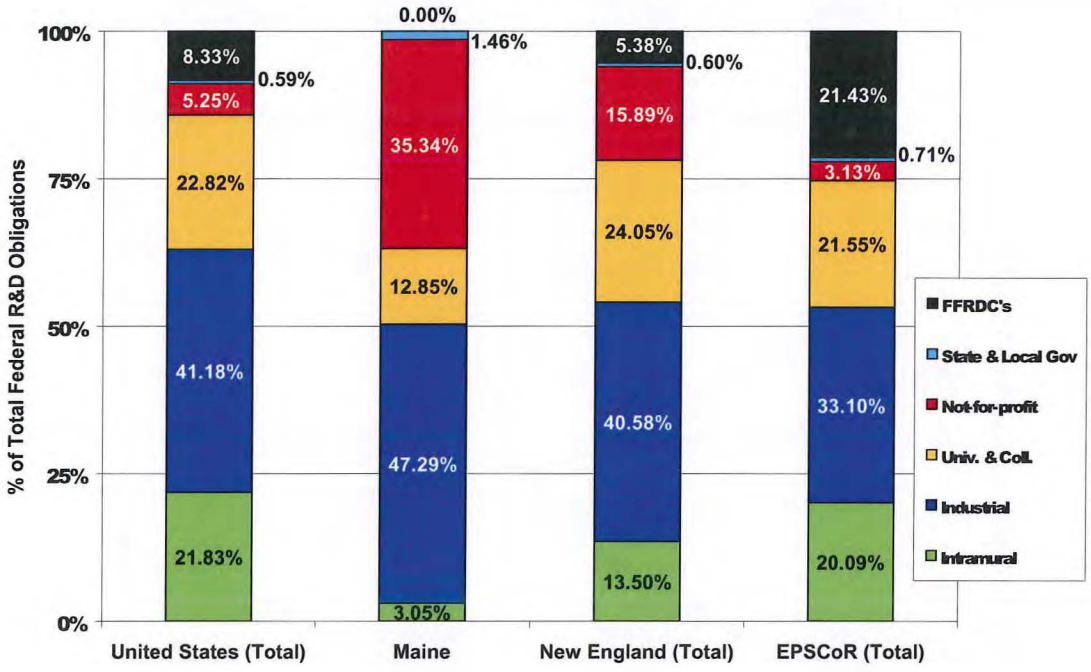
Why This Is Significant

Federal funding is an important source of financial support for R&D, contributing approximately 30 percent of total R&D funding in the U.S. This indicator measures Maine's capacity to access federal funds to support its R&D enterprise. State investments in R&D infrastructure build on the capacity of research entities to access federal R&D grants.

Related

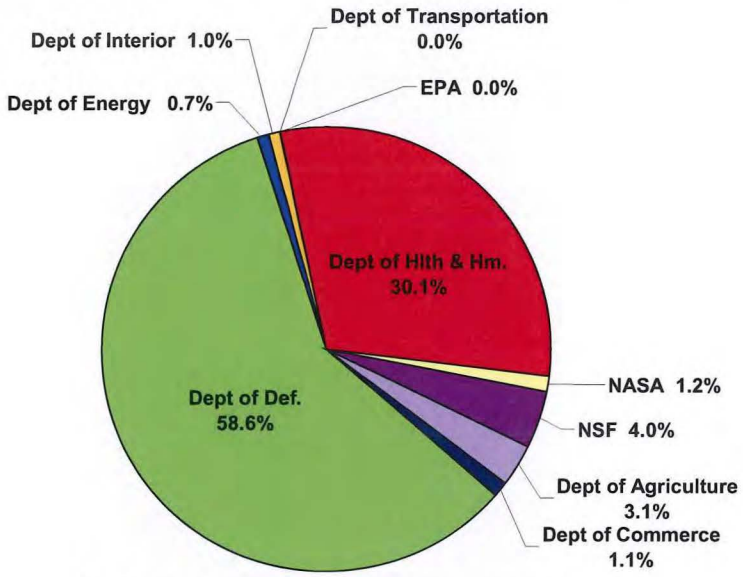
In 2005, the industrial research sector was the largest recipient of federally funded R&D in Maine, accounting for 47.3 percent of the state's federal R&D obligations. Following this was the not-for-profit research sector at 35.3 percent.[8] In comparison to the reference groups – the U.S. as a whole, New England, and the EPSCoR states – Maine's federal obligations for R&D were more highly concentrated in the not-for-profit performance sector and less concentrated in the academic sector.

Federal R&D Obligations by Performance Sector – 2005



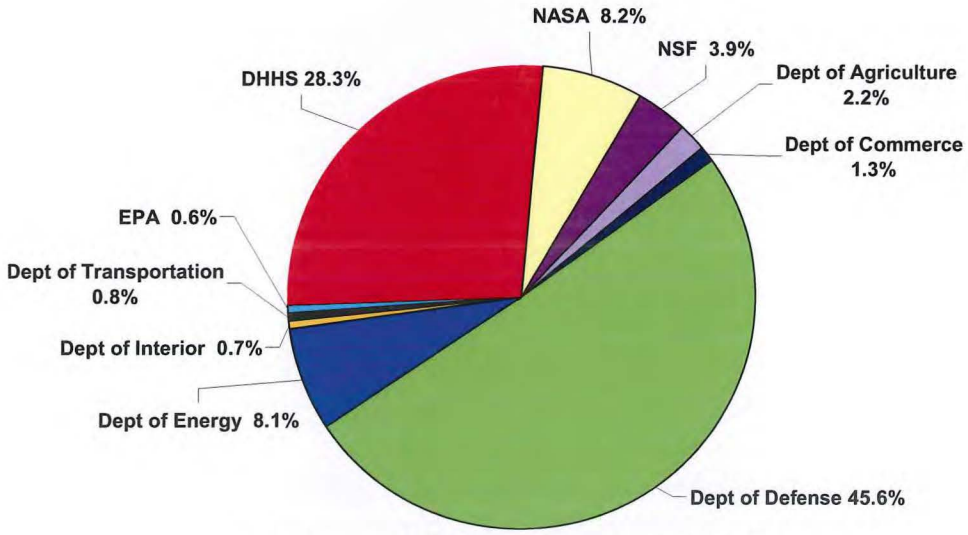
In terms of the sources of Federal funds, in 2005, 58.6 percent of Maine's federal obligations for R&D came from the Department of Defense followed by 30.1 percent from the Department of Health and Human Services. All other federal agencies accounted for a total of 11.3 percent. In comparison to the U.S. as a whole in 2004, Maine is more dependent on the Department of Defense for federal R&D obligations and similar to the U.S. with funding from the Department of Health and Human Services. There appears to be mismatch between Maine's targeted industry sectors of energy and environmental sciences and the amount of federal funding received from agencies that typically support these industries (Department of Energy and the EPA).

Federal R&D Obligations by Funding Agency – Maine - 2005



Total Federal R&D Obligations: $239,831,000

Federal R&D Obligations by Funding Agency – U.S. - 2005



Total Federal R&D Obligations: $106,986,449,000

Sources

Federal R&D obligations[9] are from National Science Foundation/Division of Science Resources Statistics; Survey of Federal Funds for Research and Development: Fiscal Years 2003, 2004, and 2005; http://www.nsf.gov/statistics. Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/. 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification.

State R&D Investments

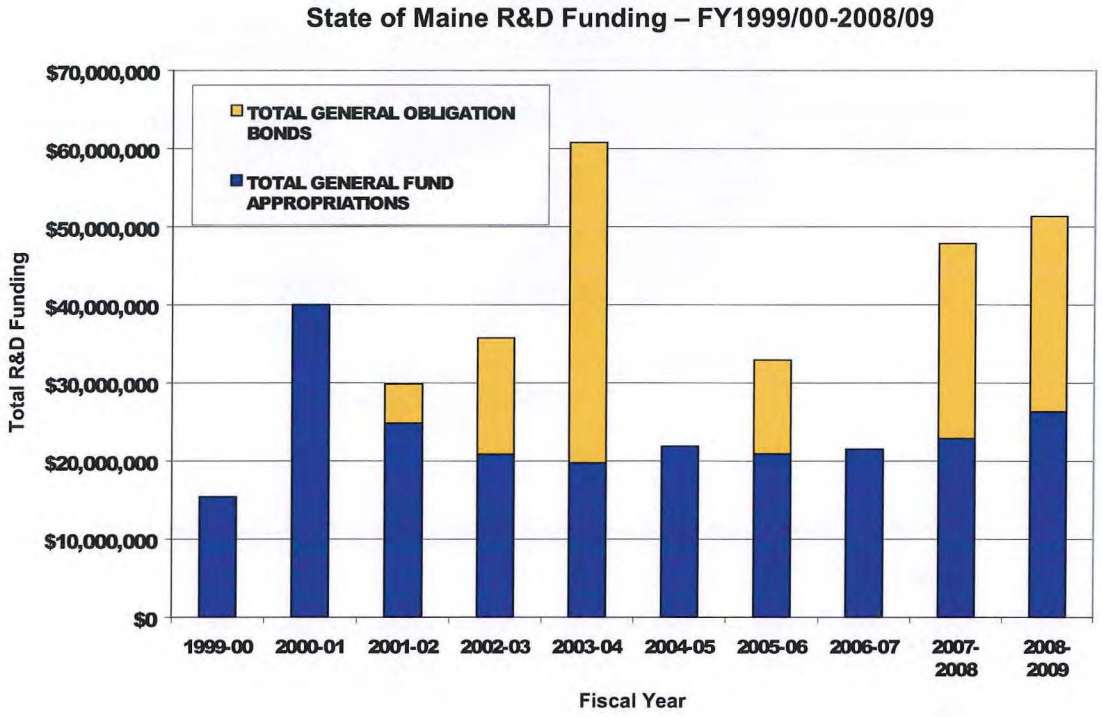
— performance summary —

Maine 1-Year Trend ↑

Maine 5-Year Trend ↑

Summary

Over the last ten years Maine has seen an increase in state-sponsored investments in research and development. In FY 1999-00, Maine had an annual investment level in R&D of $15.4 million.[10] By 2003-04, Maine's annual investment exceeded $60.7 million. Since 2004-05 Maine has maintained an annual state investment level of general fund appropriations in excess of $20 million annually.



Why This Is Significant

Maine's state-sponsored investments in research and development are used to build infrastructure and leverage federal and industry research funding. Federal R&D expenditures rarely fund research equipment and facilities. Thus, state investments are essential to build physical R&D capacity and to stimulate successful private/public research partnerships. Maine state funds, in particular those provided through the Maine Technology Institute, are also used to fund R&D in small and medium sized business. These businesses don't always have access in the near term to federal R&D funding.

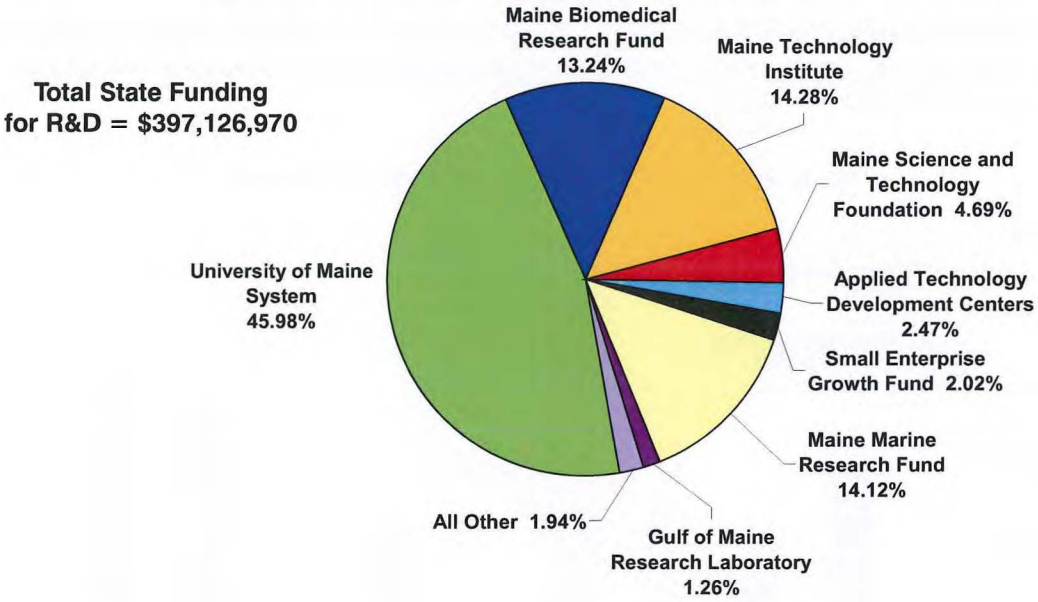
Related

From fiscal year 1996/97 to fiscal year 2008/09, Maine has invested a total of almost $400 million in state funds for R&D. Of this amount, 45.98 percent has supported programs and infrastructure of the University of Maine System[11], 13.24 percent has supported the Maine Biomedical Research Fund, and 14.28 percent has supported numerous businesses through the Maine Technology Institute.

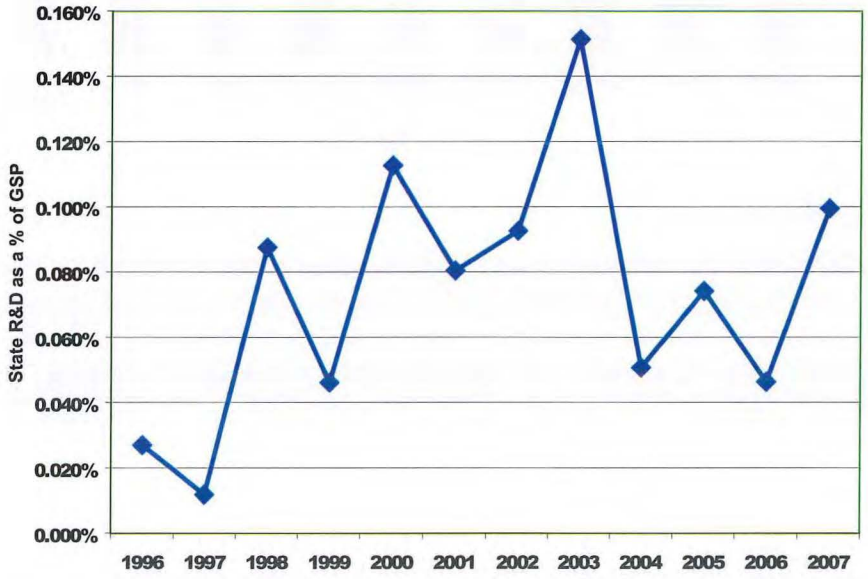
STATE R&D INVESTMENTS

As a percent of Gross State Product, Maine's R&D Funding has seen some significant increases from 1996 to 2007. In 1997, Maine's R&D funding was at a low of 0.012% of gross state product. In 2007, however, the percent had increased to 0.100%. The larger increases, such as in 2003, are reflecting the general obligations bonds that were passed in the state those years.

Maine State Funding for R&D by Program FY1996/97-FY2008/09



Maine R&D Funding as a Percent of Gross State Product – 1996-2007



Source

State R&D investment was compiled by PolicyOne Research, Inc. from data provided by the Maine Legislature, Office of Fiscal & Program Review.[12]

Endnotes

[1] In 1995 Maine had a one year spike in industry R&D relative to other R&D performance sectors to a level of $286 million. This was due primarily to a large US Department of Defense award to one company and led to a spike in total R&D in Maine relative to nearby years.

[2] Total R&D includes R&D for all performance sectors including industry, universities and colleges, non-profit institutions, federal government, and federally funded research development centers from all sources of funding. Not-for-profit performed R&D as reported by NSF includes only that which is funded by the federal government. Therefore, this data understates the intensity of not-for-profit performed R&D.

[3] This drop in industry R&D from 2005 to 2006 was driven largely by a $68 million drop in the publishing sector and a $58 million drop in the Pharmaceuticals and medicines sector; a total drop of $126 million in two sectors alone.

[4] Academic Fields of Study are defined as: Engineering (aeronautical and astronautical, bioengineering and biomedical, chemical, civil, electrical, mechanical, metallurgical and materials); Physical Sciences (astronomy, chemistry, physics); Environmental Sciences (atmospheric, earth sciences, oceanography); Mathematical Sciences; Computer Sciences; Life Sciences (agricultural, biological, medical); Psychology; Social Sciences (economics, political science, sociology); unclassified.

[5] Academic R&D performance excludes federally funded research and development centers administered by academic institutions, of which Maine has none.

[6] Excludes nonprofit federally funded research and development centers administered by academic institutions for which there are none in Maine but that do exist nationally. Also, the not-for-profit data only includes research expenditures funded by the federal government because data from other funding sources is not available on a state basis.

[7] The federal R&D data in this section represent obligations as opposed to outlays. According to NSF, obligations represent the amounts for orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated and when future payment of money is required.

[8] This includes federally funded research and development centers (FFRDC's). These are R&D-performing organizations that are exclusively or substantially financed by the Federal Government and are supported by the Federal Government either to meet a particular R&D objective or, in some instances, to provide major facilities at universities for research and associated training purposes. Each center is administered either by an industrial firm, a university, or another nonprofit institution. Maine has no FFRDC's. Intramural performers are the agencies of the Federal Government. Their work is carried on directly by federal agency personnel.

[9] Includes the obligations of the 10 or 11 major R&D supporting agencies that were requested to report this information; together they represent 96 percent or more of the total R&D obligations.

[10] Includes appropriations as well as bonds approved.

[11] Includes Maine Economic Improvement Fund, State Res. Lib. for Business, Science & Technology, Strategic Technology Initiative Program Funding, Debt Service for previous R&D Bonds, and Bonds for the Advanced Engineered Wood Composites Center, USM Bioscience Wing, and Maine Agricultural Research Farms. Includes all campuses within UMaine System.

[12] State R&D investments in Maine include portions of funding within the following program areas:

University of Maine System
Maine Technology Institute
Maine Marine Research Fund
Maine Biomedical Research Fund
Maine Applied Technology Development Center System
Centers for Innovation
MERITS
ScienceWorks
Governor's Marine Studies Fellowship
Small Enterprise Growth Fund
EPSCoR
Maine Science and Technology Foundation (now defunct)
Maine Patent Program
Gulf of Maine Research Laboratory
NASA Partnership
Downeast Institute for Applied Marine Research
Schoodic Education and Research Center
Governor's Marine Studies Fellowship
Small Enterprise Growth Fund
EPSCoR
Maine Science and Technology Foundation (now defunct)
Maine Patent Program
Gulf of Maine Research Laboratory
NASA Partnership
Downeast Institute for Applied Marine Research
Schoodic Education and Research Center

indicators:

- SBIR/STTR Funding
- Venture Capital Investments
- Patents Issued
- Entrepreneurial Activity

INNOVATION CAPACITY OVERVIEW

Financial investment, knowledge, skill, and creativity form a package of ingredients that foster an innovative business environment. This environment allows people to take risks, create new products and services, and grow their business ventures.

In terms of growing small innovative businesses, Maine performs well on only one of the four indicators measured. Maine is a leader in the area of SBIR/STTR research relative to the state's size. Maine's and New England's levels of SBIR/STTR funding as a percent of GSP exceeded the levels of U.S. average and all EPSCoR states combined.

Maine needs to improve its efforts in terms of attracting venture capital, producing patents, and starting new companies. In the latest years for which data is available, Maine lags New England, the U.S., and EPSCoR states as a whole in generating patents. Maine and the EPSCoR states also continue to lag the nation and New England in attracting venture capital. However, since venture capital is so highly concentrated in just a few states, using U.S. averages can distort Maine's relative performance in this area. In terms of entrepreneurial activity as measured by persons starting businesses, Maine has seen a decline after being above all three of the reference groups from 2004 to 2006. As Maine continues to develop its capacity in other areas (education, R&D, and connectivity), its entrepreneurial spirit will need to rebound to help convert capacity building into economic output.

The findings in this index are consistent with the findings in Maine's Comprehensive Evaluation of State Investments in R&D that Maine needs to continue to improve its ability to transfer knowledge and technology to commercial applications and ventures. Recent state investments in programs including the Maine Patent Program and the Small Enterprise Growth Fund combined with continued R&D support for entrepreneurs through the Maine Technology Institute and the Applied Technology Development Centers can help Maine address these areas of concern.

SBIR/STTR Funding

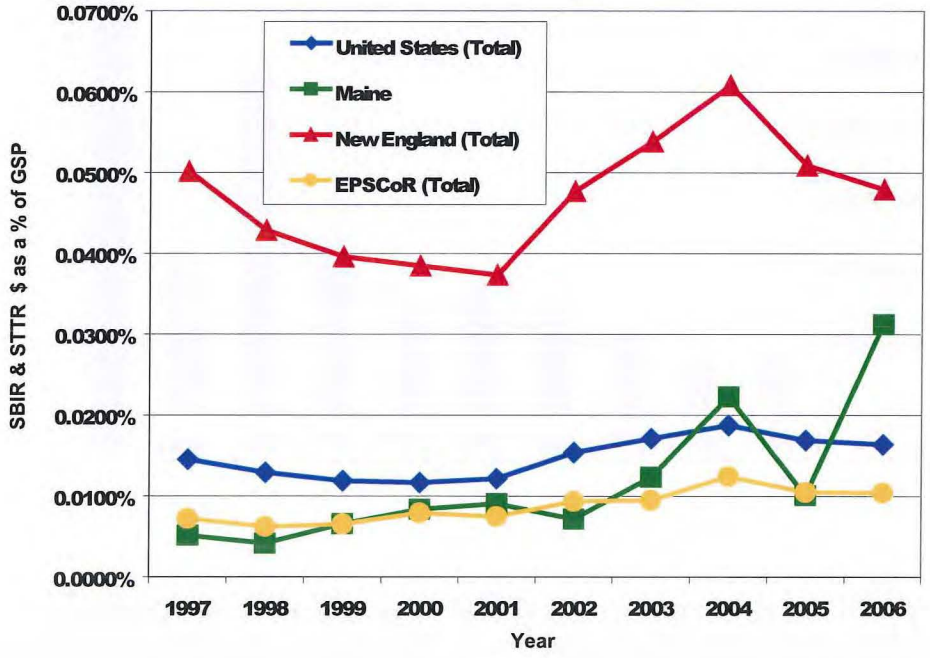
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	8

Summary

Between 1997 and 2006, Maine experienced an increase in SBIR/STTR funding as a percent of gross state product (GSP), with a drop occurring in 2005 and a rebound in 2006. In 1997, SBIR/STTR funding in Maine represented 0.0051 percent of GSP; in 2006 it represented 0.0312 percent. This recent increase elevated Maine above the levels for the U.S. as a whole, which was 0.0164 percent and the level for the EPSCoR states combined at 0.0104 percent. Maine remained below the level for the New England States as a whole in 2006, which were at 0.0479 percent.

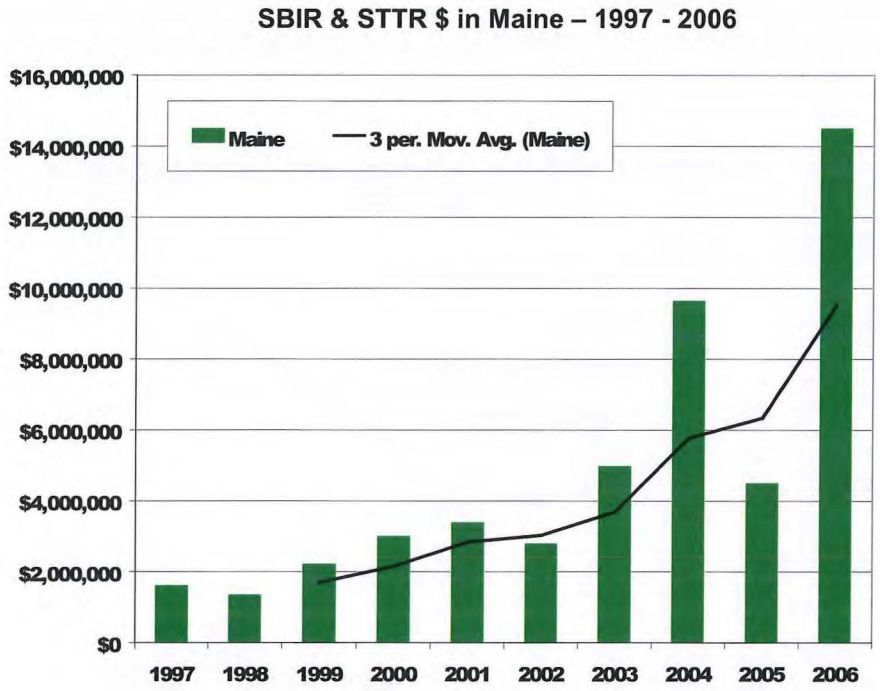
Total SBIR & STTR $ as a Percent of Gross State Product 1997-2006



Why This Is Significant

The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are important sources of early stage capital for technology-based entrepreneurs. The U.S. Congress established the SBIR program with the purpose of increasing opportunities for small businesses to participate in federal research and development and to stimulate technological innovation. The program funds high-risk R&D that may have commercial potential. It offers a way for small firms to obtain seed money to do the advanced R&D often necessary to enter into new projects. Similarly, Congress created the STTR program to encourage commercialization of university and federal laboratory R&D by small businesses and to foster the development of partnerships between universities and small firms. This type of funding and support is rarely available in the private marketplace, so the programs serve as a critical lifeline for research-intensive small businesses.

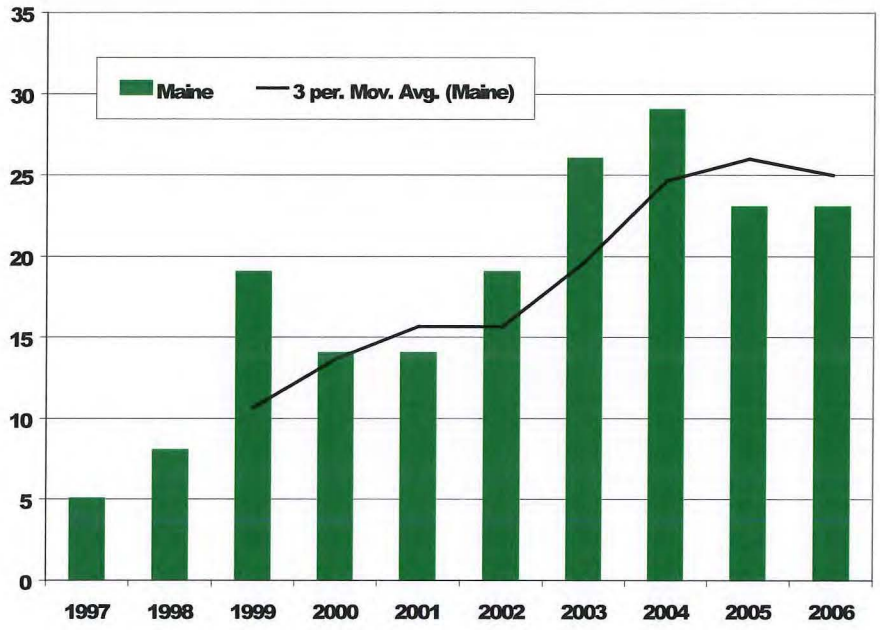
These programs are valuable in that they help small businesses build scientific and technical leadership in their industries. In an increasingly competitive marketplace, such leadership is key to innovation and the subsequent sales that innovation brings to small firms. Success in winning SBIR awards also is often helpful in attracting outside capital investments. Finally, success in the SBIR/STTR programs serves as a proxy indicator for Maine's ability to grow new generations of high-potential entrepreneurs.



Related

In 2006, the SBIR/STTR programs provided more than $2 billion nationwide in federally sponsored, early stage capital for entrepreneurial technology-based businesses. In 2006, Maine companies received a total of $14.5 million in SBIR/STTR awards. This represented an increase of 425 percent since 2002. In terms of number of awards, in 2006, Maine received 23 awards, down from 2004 and the same as in 2005.

SBIR & STTR Awards in Maine – 1997 - 2006



Sources

SBIR/STTR data is from the U.S. Small Business Administration, www.sba.gov/sbir. Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/; 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification.

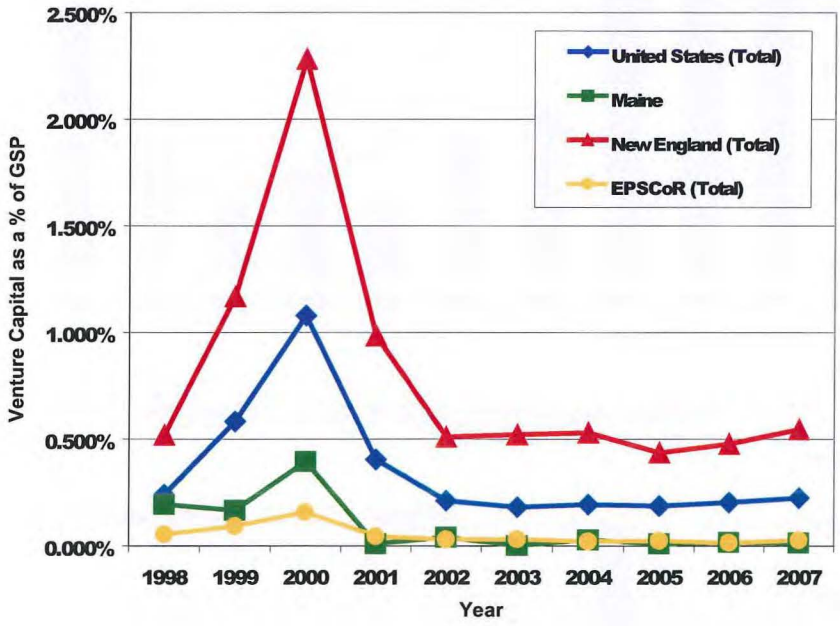
Venture Capital Investments

— Performance Summary —	
Maine 1-Year Trend	↓
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	38

Summary

In 2007, venture capital investments in Maine were 0.014 percent of gross state product (GSP). This was significantly lower than the New England level of 0.546 percent and the total U.S. level of 0.224 percent for the same year, but on par with the level for all EPSCoR states combined at 0.027. New England's high level is skewed by the performance of Massachusetts which remains the second largest state recipient of venture capital investments. (Over 60% of all reported venture capital goes to California and Massachusetts) Maine's venture capital investments as a percentage of GSP have remained relatively low between 2001 and 2007. Previously from 1998 to 2000 venture capital levels had been somewhat higher with an increase to a peak level of 0.394 percent in 2000.

Venture Capital Invested as a Percent of Gross State Product – 1998-2007



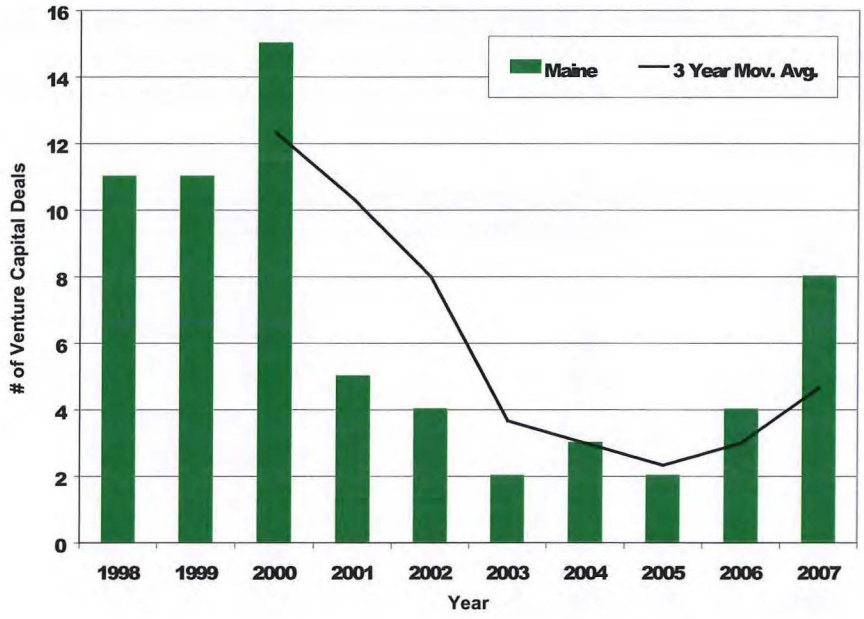
Why This Is Significant

Venture capital, along with other equity and near equity capital, is a critical source of funding for technology-based startups and companies with high growth potential. States with access to venture capital tend to create technology-based companies at higher than average business formation rate. While the U.S. Federal Reserve reports that less than two percent of small business financing comes from venture capital, this form of capital is significant for companies with the highest growth potential, including technology-based companies. The venture capital industry is highly concentrated in a few states, such as California and Massachusetts. States outside of traditional venture capital centers often have limited access to these funds. As such, it is important for the State to develop ways of attracting interest from venture capitalists in nearby centers such as Boston. Maine's proximity to the Boston metro area represents a potential competitive advantage in this regard and one which Maine has yet to fully take advantage of.

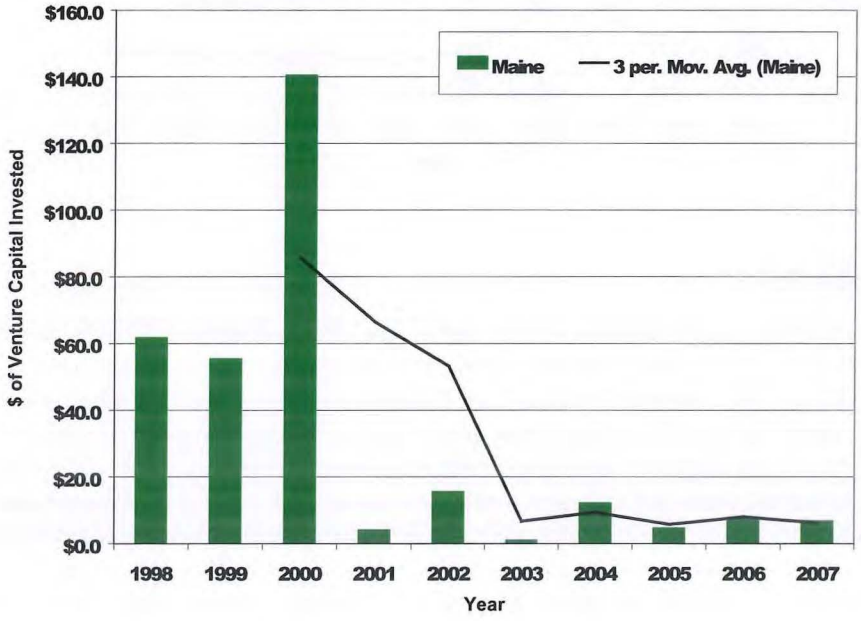
Related

In 2007, Maine received $6.6 million in venture capital investments. This represented a decrease of 13 percent from the Maine 2006 level of $7.6 million. Maine's $6.6 million in venture capital received in 2007 was part of eight deals within the industry classes of biotechnology, computers & peripherals, consumer products & services, financial services, industrial/energy, medical devices & equipment and telecommunications.[1]

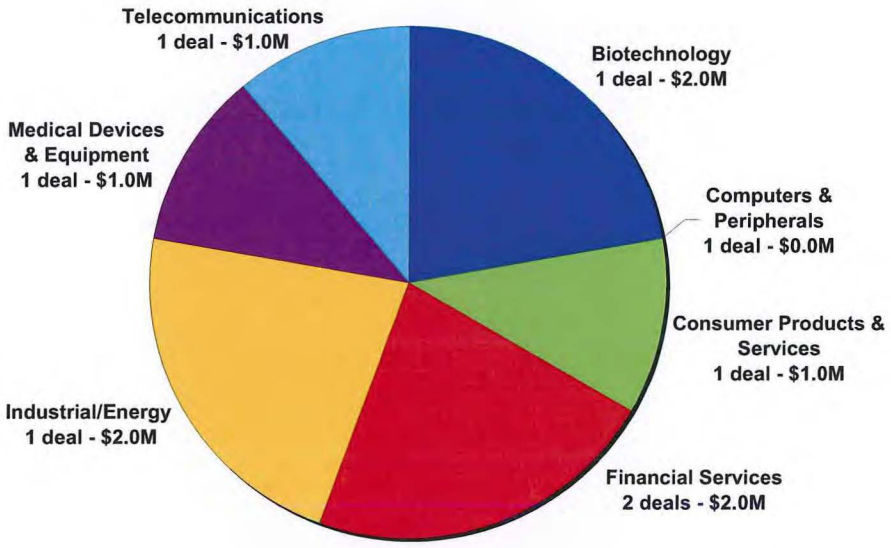
Venture Capital Deals in Maine – 1998-2007



Venture Capital $ Invested in Maine – 1998-2007



Venture Capital Invested in Maine by Industry Sector – 2007



Total # of Deals = 8 Total $ Invested = $9.0 Million

Sources

Venture capital investments data are from MoneyTree Venture Capital Profiles by State; based on Pricewaterhouse Cooper/Venture Economics/National Venture Capital Association Surveys; http://www.venturexpert.com/VxComponent/static/stats/2008q3/0MAINMENU.html; Data Current as of September 2008. Venture Capital Invested in Maine by Industry Sector is from http://www.pwcmoneytree.com/. Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/; 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification.

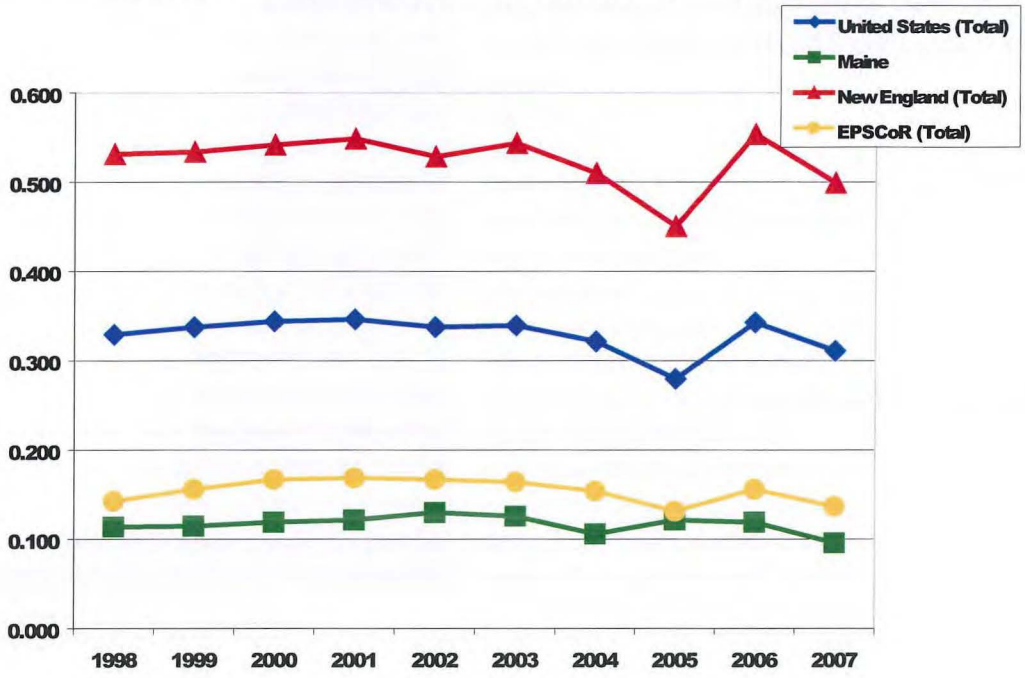
Patents Issued

— Performance Summary —	
Maine 1-Year Trend	↓
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↓
Maine's National Ranking	43

Summary

The number of patents issued per 1,000 residents of Maine lagged behind the reference groups.[2] In 2007, there were 0.096 patents issued per 1,000 Maine residents in comparison to 0.31 for the U.S. as a whole, 0.50 in New England, and 0.14 among the EPSCoR states. This trend has remained relatively consistent from 1997 through 2004, however, in 2005, Maine improved on this indictor while the reference groups saw a decline. This was reversed in 2006, when Maine had a slight decrease (0.002) while the reference groups all increased. In 2007, Maine and the reference groups all saw a decline.

Patents Issued (all types) per 1,000 Residents – 1998-2007



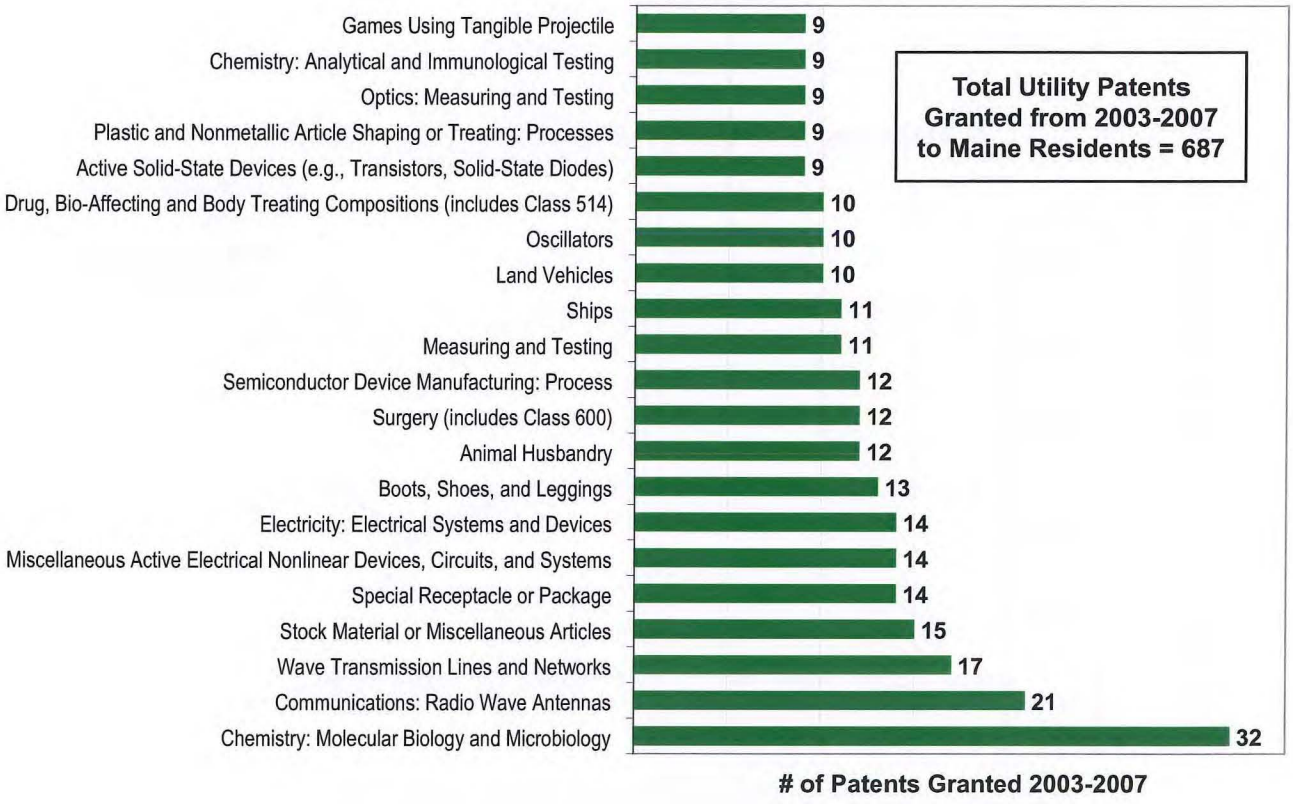
Why This Is Significant

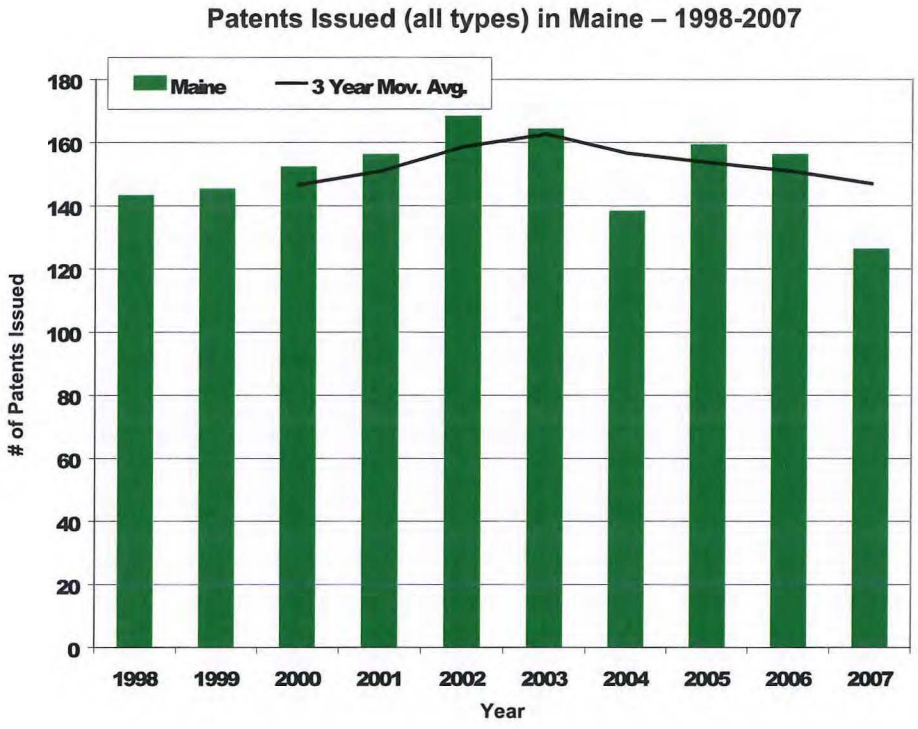
Patent activity indicates the level of innovative thinking and research that eventually may lead to commercialization of new products and services. Individuals and companies seek patent protection in anticipation of the commercial value and marketability of their new ideas. In 2000, Maine created the Maine Patent Program to provide patent assistance to businesses and individuals. This program has served over 500 business and individuals since its inception.

Related

Between 2003 and 2007, there were a total of 687 utility patents[3] - that is, patents for inventions issued to Maine residents. The largest percent of these fell within the classification entitled "chemistry: molecular biology and microbiology," which accounted for 4.7 percent. Other significant utility classes in Maine since 2003 included communications: radio wave antennas; wave transmission lines and networks; and stock material or miscellaneous articles.

Utility Patents Issued by Technology Class in Maine
2003-2007 – Top Classes





Sources

Total patents issued was from "Patent Counts by Country/State and Year, All Patents, All Types", January 1, 1977-December 31, 2007; by Calendar Year; US Patent and Trade Mark Office, December 2007; http://www.uspto.gov/ . Utility patent data were from "Patenting by Geographic Region (State and Country), Breakout by Technology Class, 2003-2007 Utility Patent Grants by Calendar Year of Grant, U.S. Patent and Trademark Office; www.uspto.gov. Population is from 1990-1999 - Table CO-EST2001-12-00 - Time Series of Intercensal State Population Estimates: April 1, 1990 to April 1, 2000; Population Division, U.S. Census Bureau; Release Date: April 11, 2002; July 2000-July 2006 -Table 1: Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2007 (NST-EST2007-alldata), Population Division, U.S. Census Bureau, Release Date: August 18, 2008; http://www.census.gov/popest/estimates.php

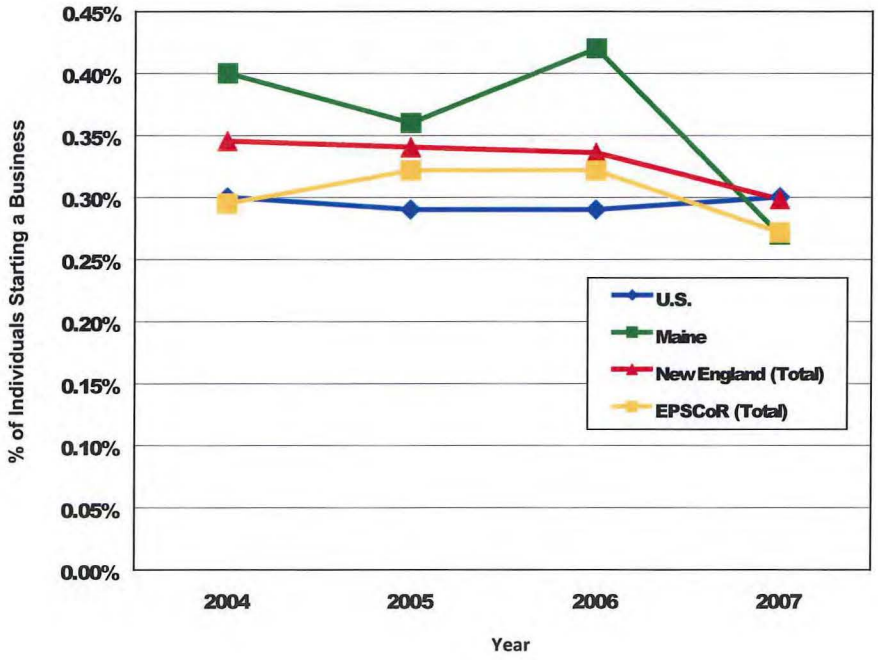
Entrepreneurial Activity

— Performance Summary —	
Maine 1-Year Trend	↓
Maine 3-Year Trend	↓
Maine Compared to EPSCoR	↔
Maine's National Ranking	31

Summary

Based on the Kauffman Index of Entrepreneurial Activity (KIEA),[5] between 2004 and 2007, Maine had gone from being at a higher level of entrepreneurial activity than the reference groups to being tied with EPSCoR as the lowest of the reference groups. This indicator measures the percent of persons within the general population who have recently started a business. As such, the KIEA data measures the number of non-business owners who started a business each month. From 2004 through 2006 Maine performed slightly above average compared to U.S. and other EPSCoR states, yet in 2007 the state experienced a significant decline. In 2007, Maine's entrepreneurial index was 0.27 percent which was lower than that for the U.S. as a whole (0.30 percent), New England (0.30 percent), and the same as the EPSCoR states (0.27 percent). Maine, as a state, ranked thirty-first in the nation on this indicator.

Index of Entrepreneurial Activity 2004 - 2007



Why This Is Significant

Entrepreneurial activity measures the willingness of persons to take risks and grow a business. This measure helps assess the entrepreneurial propensities of Maine residents: do they have an interest and desire to start a business? Are resources and support networks readily available for those likely to take the entrepreneurial leap? A strong regional economy provides an environment that encourages this risk taking and supports the efforts to start and grow businesses. Maine has put in place a host of programs to encourage and support entrepreneurs in science and technology in the areas of financing, technical services, networking, marketing, and business development

Sources

Estimates calculated by Robert W. Fairlie, University of California, Santa Cruz, using the Current Population Survey and reported in "Kauffman Index of Entrepreneurial Activity"; Ewing Marion Kauffman Foundation www.kauffman.org

Endnotes

[1] Amounts for Venture Capital Invested in Maine by Industry Sector are greater than total venture capital amounts for the state due to rounding that was done by the source for the data.

[2] The residence of the first-named inventor determines the origin of a patent.

[3] The utility patent data excludes design patents, plant patents, reissues, defensive publications, and statutory inventions registrations.

[4] Entrepreneurial activity is the percent of individuals (ages 20–64) who do not own a business in the first survey month that start a business in the following month with fifteen or more hours worked per week.

indicators:

- High Technology Employment Growth
- High Technology Business Establishment Growth
- S&E Occupations in the Workforce
- Ph.D. Scientists and Engineers in the Labor Force
- Gross State Product Growth
- Per Capita Income

EMPLOYMENT & OUTPUT CAPACITY OVERVIEW

In some ways, it is difficult to speak of high technology industries as nearly every modern industry sector has heavy reliance on technology. Nonetheless, certain sectors, especially those that support high technology products and services, play an important role in a state's business growth and economic prosperity. Technology intensive economic activity tends to be concentrated in areas with clusters of professionals, companies, and institutions are in place to help develop a deep pool of skilled workers and networks of investors and entrepreneurs.

Employment and business growth are primary economic outcome measures. Technology-focused firms have an especially pronounced impact on these outcomes because they tend to pay higher than average wages and provide an array of career options. In Maine, between 2006 and 2007, high technology employment dropped 0.05 percent in Maine while all the reference groups experienced increases. During the same period high technology business establishment growth in Maine outpaced that of New England but lagged that of the EPSCoR states and the U.S. as a whole. The high technology employment and business growth numbers in Maine are cause for concern in the state's effort to transform and grow its innovation economy.

Workforce data signifies a need for the state to strengthen its labor market in the areas of science and technology. In terms of occupations that are specifically related to science and engineering, in 2006, there were an estimated 15,950 science and engineering (S&E) occupations in Maine's workforce. On a per total worker basis, this ratio was lower than that of the reference groups.

At the highest technical levels, Ph.D. recipients represent the underpinnings of an R&D based workforce. In 2006, there were an estimated 2,350 doctoral scientists and engineers in Maine's labor force. On a per total worker basis, Maine was slightly higher than the level in the EPSCoR states for the same year, but trailed New England and the nation as a whole.

Gross state product and per capita income are the end outcome indicators for investing in research and development and supporting technology intensive industries. Between 2006 and 2007, Maine's gross state product growth was lower than all the reference groups. In 2007, Maine's per capita income was below that of all the reference groups. Taken together these two indicators point out that Maine has yet to reap the full potential of a technology-intensive economy.

High Technology Employment Growth

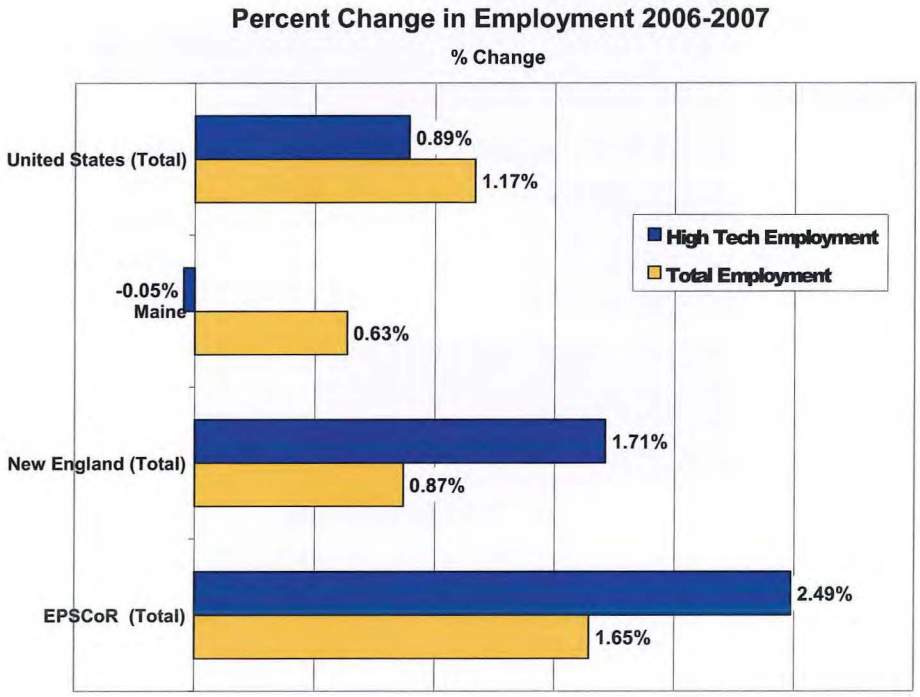
— performance summary —

Maine Compared to EPSCoR ↓

Maine's National Ranking **35**

Summary

Between 2006 and 2007, high technology employment[1] declined by 0.05 percent in Maine. During this same period, the reference groups all experienced growth in high tech employment with U.S. as a whole (0.89 percent), New England (1.71 percent), and EPSCoR states (2.49 percent). Maine's technology related employment growth is falling behind its total employment growth. During the same period in Maine total employment in all industries increased 0.63 percent. This is in contrast to New England and the EPSCoR states which all saw high technology employment grow at a faster pace than total employment.



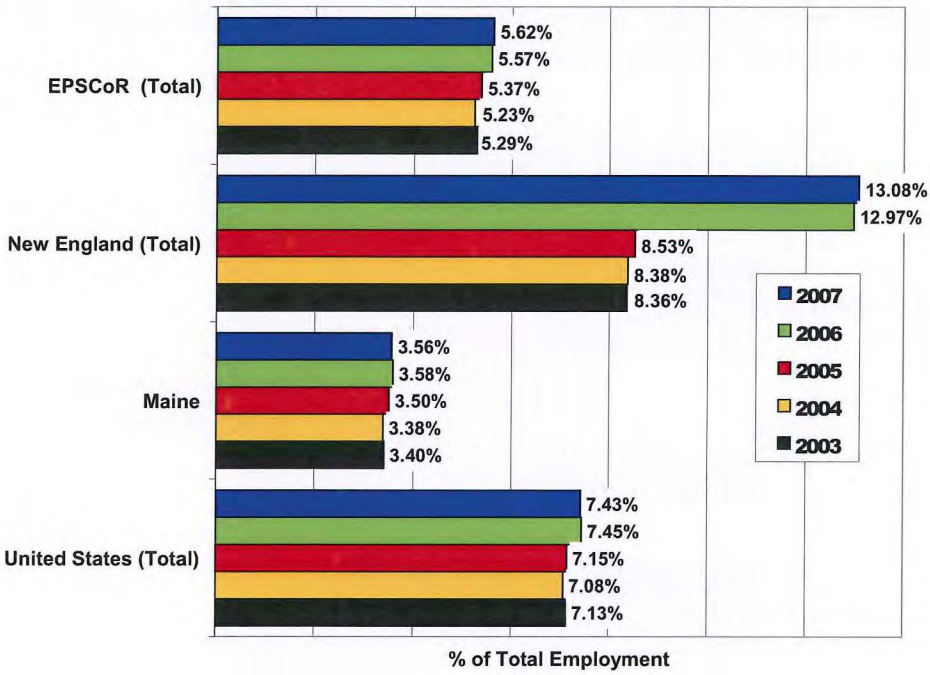
Why This Is Significant

High technology job growth is an outcome indicator of Maine's ability to build, recruit and retain an educated and technically skilled workforce. It measures the level of employment opportunity created by the Maine economy. High technology jobs typically pay higher wages than non-technology related jobs. Therefore, employment growth in technology-intensive businesses helps increase the standard of living among Maine residents.

Related

In 2007, Maine had a total employment level of 602,321 workers. Of that amount, 21,419 or 3.56 percent were employed in high technology businesses. Maine's concentration of employment in high technolgy industries is lower than the concentrations in the reference groups. In 2007, 7.43 percent of U.S. employment was in high technology industries; in New England the concentration level was 13.08 percent; and among EPSC0R states, 5.62 percent.

Percent of Employment in High Technology Sectors 2003-2007



Sources

High technology and total employment were from special data tabulations of the County Business Patterns, U.S. Census Bureau, and U.S. Department of Commerce and were provided by the Center for Business and Economic Research, University of Southern Maine.

High Technology Business Establishment Growth

— performance summary —

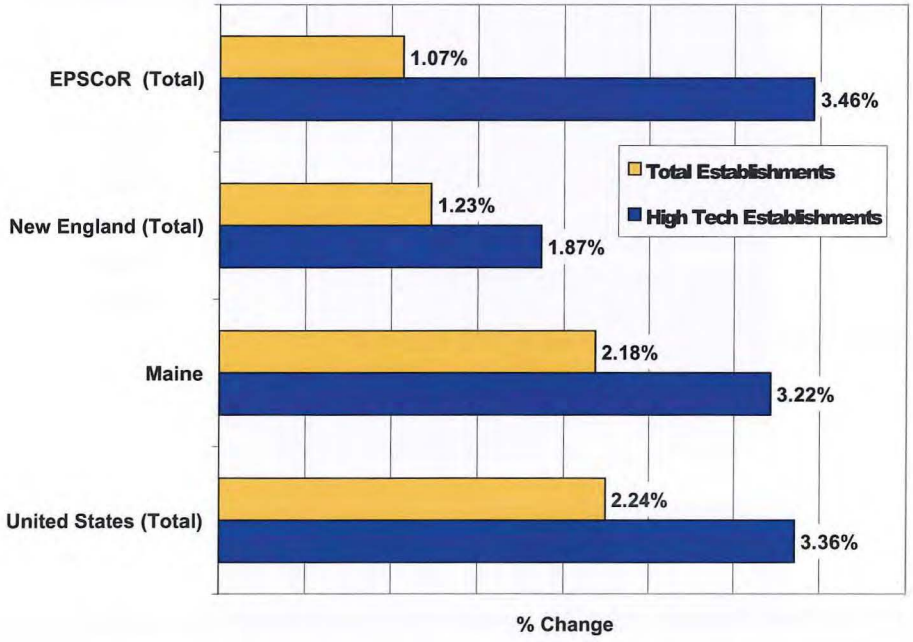
Maine Compared to EPSCoR ↓

Maine's National Ranking 44

Summary

Between 2006 and 2007, the number of high technology business establishments[2] in Maine increased by 3.22 percent. During this period, high technology business establishment growth was higher in Maine than New England (1.87) but lower than the EPSCoR states, (3.46) and the U.S. as a whole (3.36). During this same period, Maine's growth in high technology establishments outpaced the growth of all business establishments in Maine, which experienced an increase of 2.18 percent.

Percent Change in Establishments 2006-2007

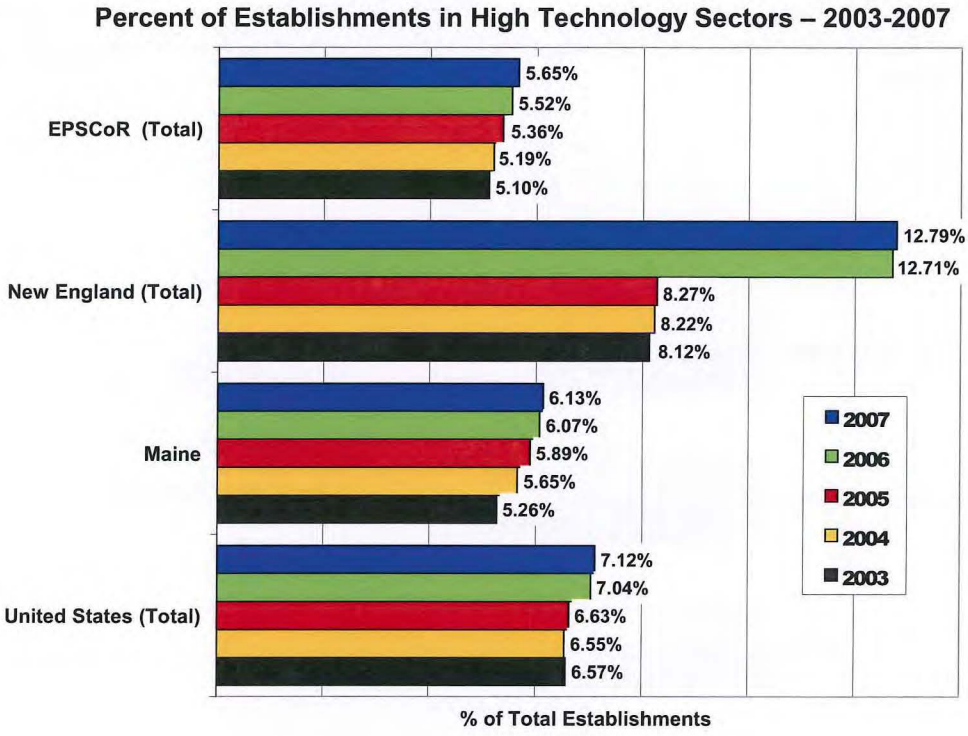


Why This Is Significant

This indicator is a measure of how successful a region is at growing new technology businesses; ultimately, it is a measure of the concentration of high technology in a state. It is an indication of a state's economic conditions, business climate, and availability of support for growth. Maine's future prosperity depends on its ability to support the creation of higher-paying jobs, and this outcome depends on the health of Maine's primary job creators—businesses. Since technology firms tend to pay higher than average wages, growth on this indicator is an important metric for assessing Maine's overall capacity to provide good career options for future generations.

Related

In 2007, high technology business establishments in Maine represented 6.13 percent of all business establishments. In 2007, in the U.S. as a whole, high technology business establishments represented 7.12 percent of all establishments; in New England, 12.79 percent; and among EPSCoR states, 5.65 percent.



Sources

High technology and total establishments were from special data tabulations of the County Business Patterns, U.S. Census Bureau, and U.S. Department of Commerce and were provided by the Center for Business and Economic Research, University of Southern Maine.

Scientists and Engineers in the Workforce

— performance summary —

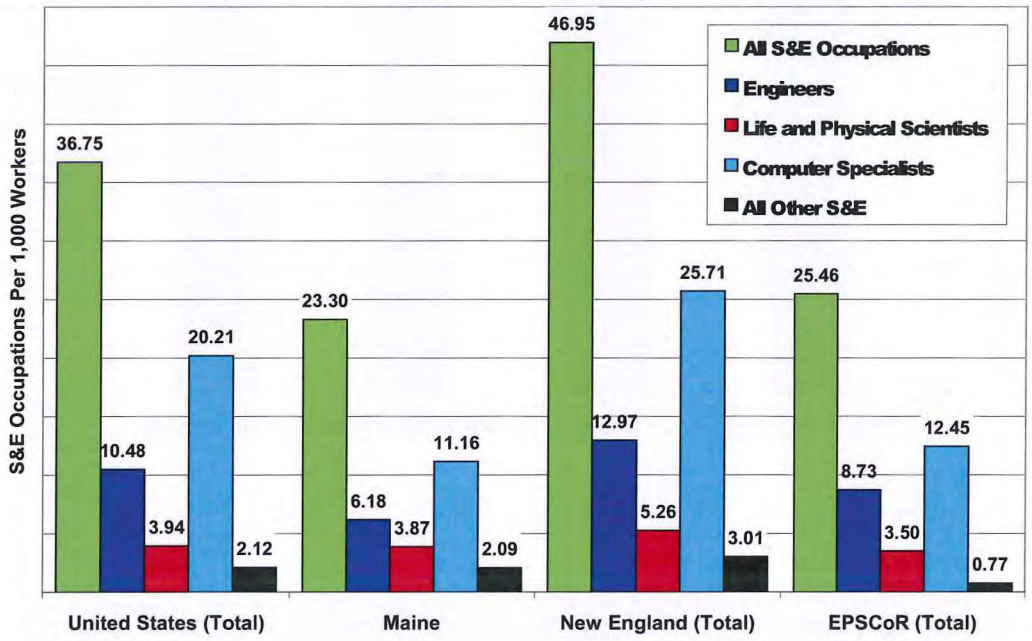
Maine Compared to EPSCoR ↓

Maine's National Ranking 44

Summary

In 2006, there were an estimated 15,950 science and engineering (S&E) occupations in Maine's workforce[3]. This represented 23.30 S&E occupations for every 1,000 Maine workers and lagged behind the U.S. as a whole (36.75), New England (46.95), and the EPSCoR states (25.46).

S&E Occupations in the Workforce Per 1,000 Workers – 2006

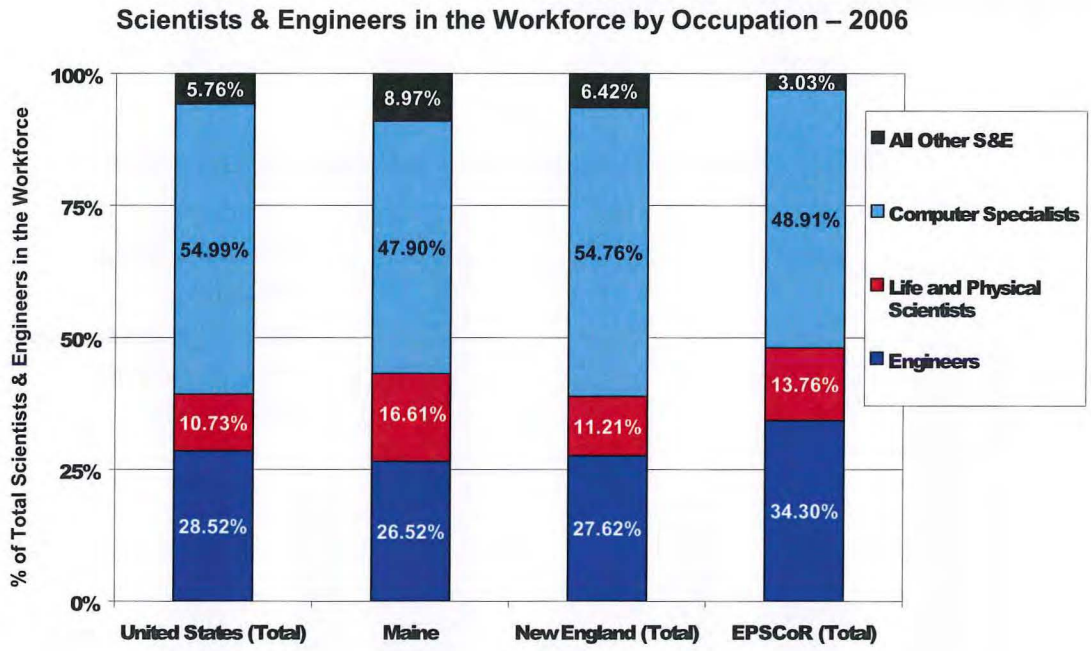


Why This Is Significant

A labor market of scientists and engineers is essential to creating a vibrant research, development and technology enterprise. There is a direct correlation between the percent of the labor force in science and engineering occupations and the growth of health of the innovation-based industries. This indicator is a measure of the state's ability to attract and retain highly skilled and highly educated workers who are critical to an innovation driven economy.

Related

In 2006 the largest percent (47.9 percent) of S&E occupations in the Maine workforce were computer specialist occupations. This was followed by engineers at 26.5 percent, and life and physical scientists at 16.6 percent. All other S&E occupations accounted for 9 percent. In relation to the reference group, Maine had a higher concentration of occupations in life and physical sciences.



Sources

Science and engineering occupations is from National Science Foundation, Division of Science Resources Statistics, Science & Engineering Indicators 2008, http://www.nsf.gov/statistics/seind08/; based on data from U.S. Department of Labor, Bureau of Labor Statistics, Occupational Employment and Wage Estimates; and Local Area Unemployment Statistics. Workforce is based on civilian labor force and is from U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - http://www.bls.gov/lau/home.htm; 1990-2000 reflects new modeling approach and re-estimation as of March 2007; 2000-2007 reflects revised population controls and model re-estimation through 2007.

Ph.D. Scientists and Engineers in the Labor Force

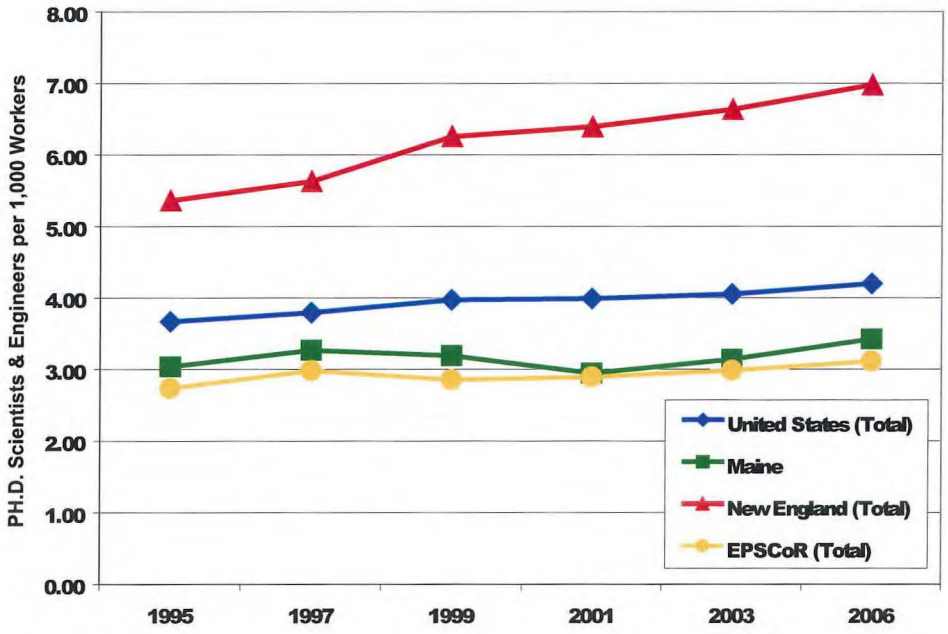
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	28

Summary

In 2006, there were an estimated 2,350 doctoral scientists and engineers in Maine's labor force. This represented 3.4 doctoral scientists and engineers for every 1,000 Maine workers and was slightly higher than the level in the EPSCoR states (3.1) for the same year. However, Maine lagged behind New England and the nation as a whole. In 2006 New England had 6.9 employed doctoral scientists and engineers per 1,000 workers and the U.S. had employed 4.2.

PH.D. Scientists & Engineers in the Workforce – 1995-2006



Why This Is Significant

Doctoral level researchers design and lead the research and development programs that generate new products, processes, technologies, and services. They also build vital linkages between Maine business and institutions with international R&D expertise. This indicator measures Maine's ability to attract and retain Ph.D. level workers.

Sources

Ph.D. scientists and engineers data is from Science and Engineering Indicators 2008 - http://www.nsf.gov/statistics/seind08. Workforce is based on civilian labor force and is from U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - http://www.bls.gov/lau/home.htm; 1990-2000 reflects new modeling approach and re-estimation as of March 2005; 2000-2007 reflects revised population controls and model re-estimation through 2007.

Gross State Product Growth

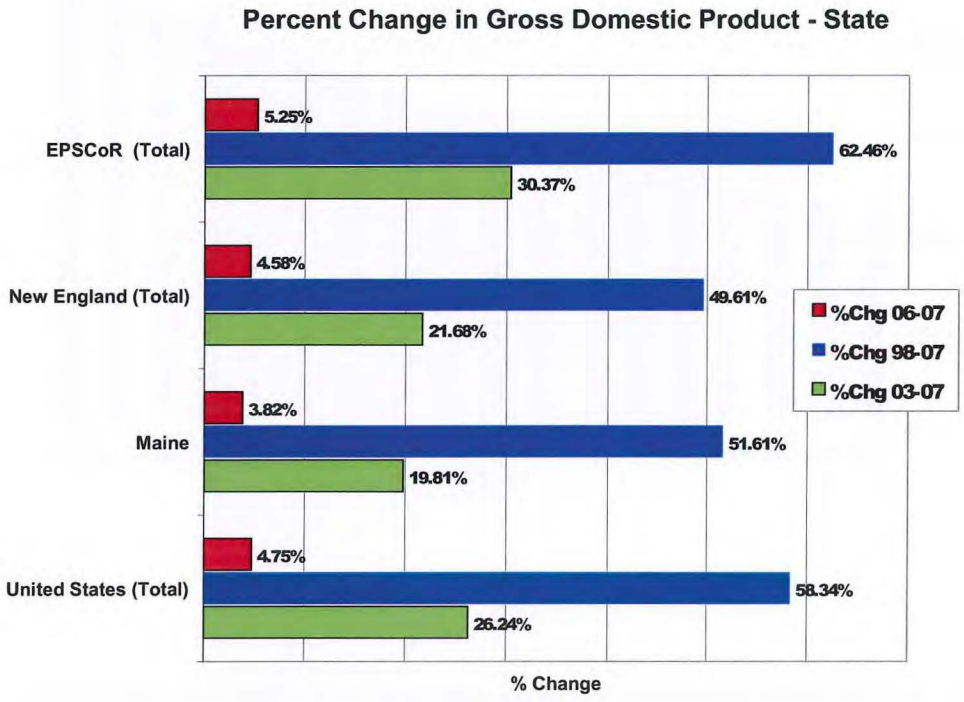
— performance summary —

Maine Compared to EPSCoR ↑

Maine's National Ranking **39**

Summary

Between 2006 and 2007, Maine's gross state product (GSP) grew 3.82 percent, a level that was lower than all the reference groups. During this same period, GSP grew 4.75 percent in the U.S. as a whole, 4.58 percent in New England, and 5.25 percent among the EPSCoR states combined. Maine also fell behind the United States and the EPSCoR states in the five-year and ten-year trends, but came in slightly above New England for the ten-year trend. In this area, Maine had a ranking of 39, which was up from the previous year's ranking of 48. This improvement in rank is less a reflection of Maine's strong performance and more a result of weaknesses in other state economies.

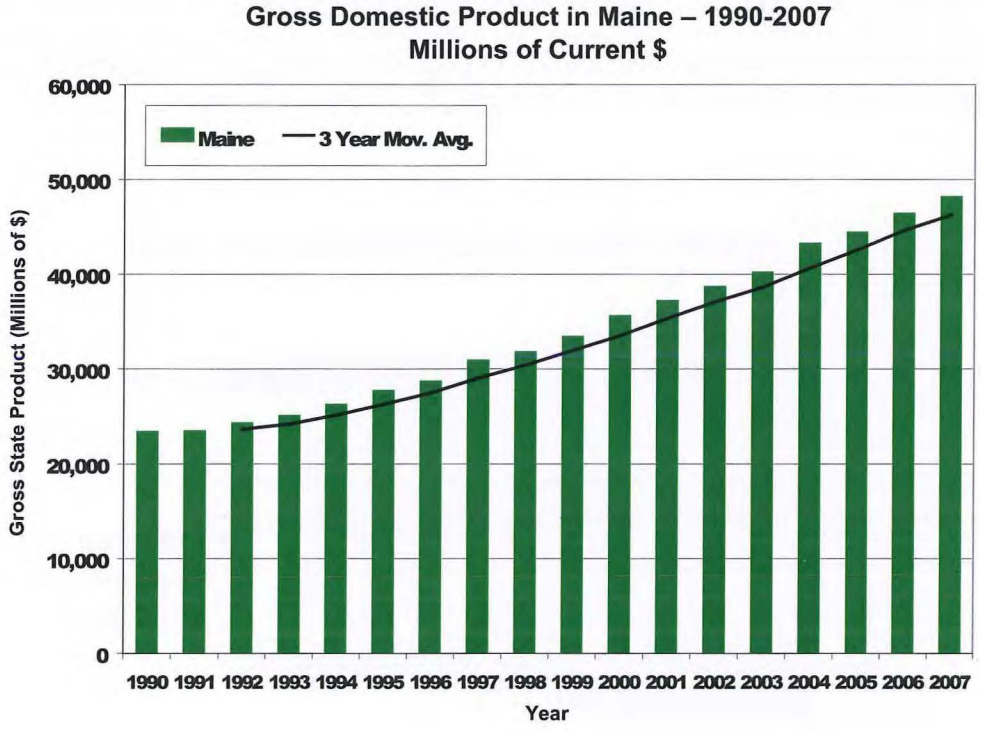


Why This Is Significant

Gross state product is a comprehensive indicator of statewide total economic output. Growth in GSP relative to other states indicates a strengthening of a state's overall economy.

Related

In 2007 Maine's GSP exceeded $48 million. After a slow growth period in the early 1990's, GSP has since experienced steady growth in Maine.



Sources

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2007; http://www.bea.gov/regional/gsp/; 1997-2007 is based on NAICS while 1980-1996 is based on SIC industry classification

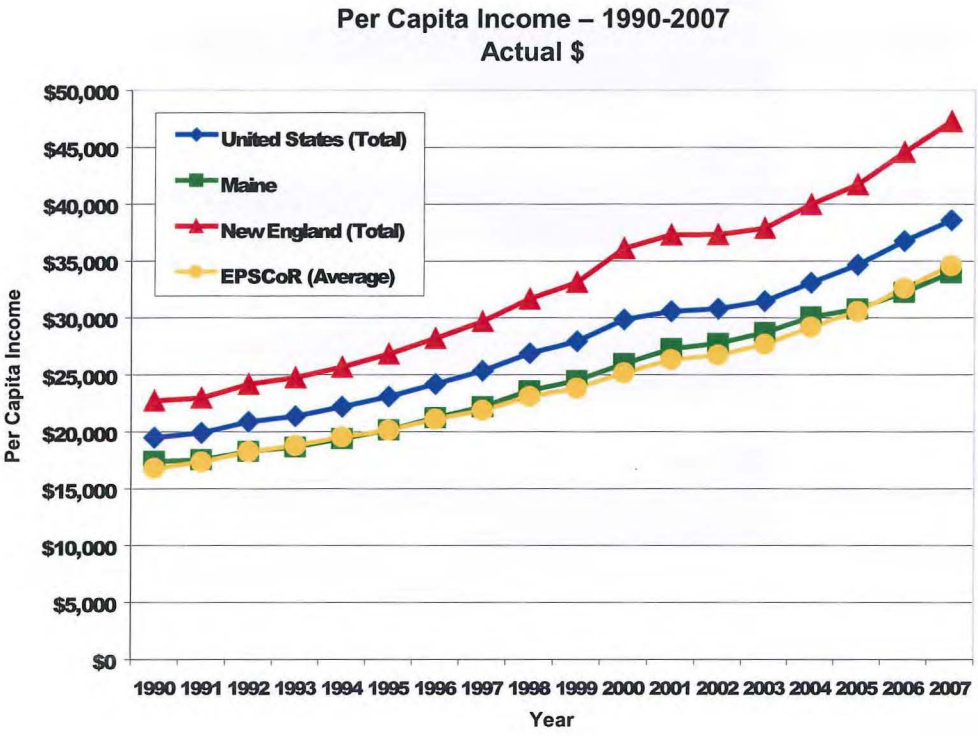
Per Capita Income

— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	36

Summary

In 2007, Maine's per capita income (PCI) was $33,962. This fell slightly below the EPSCoR states level of $34,611 and fell further below that of the U.S. as a whole ($38,564) and the New England level of ($47,256). Since 1990, Maine and the EPSCoR states have followed the same trend and have remained below the United States as a whole and the New England states. The growth has remained relatively steady across all of the reference groups over this period of time.



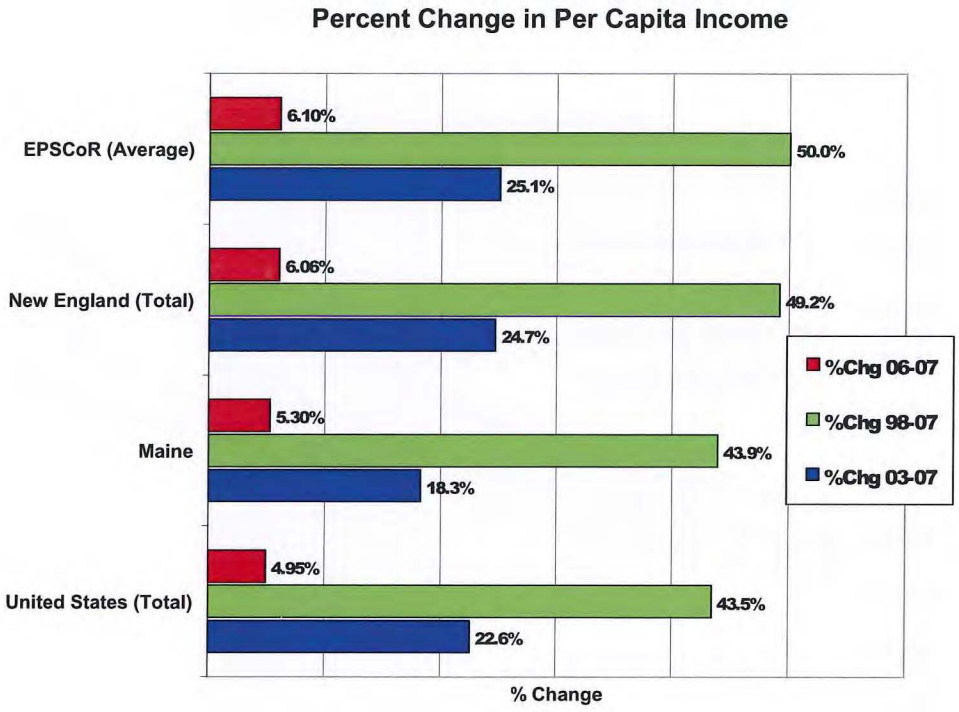
Why This Is Significant

While GSP measures comprehensive economic performance, income is an indicator of individual wealth. It is in this sense that per capita income is the ultimate end outcome for investing in science and technology: increasing personal wealth and therefore quality of life. PCI is the true bottom line measure of a state's prosperity.

PER CAPITA INCOME

Related

Between 2006 and 2007 Maine's per capita income grew 5.3 percent, a level that was lower than all the reference groups except for the United States as a total. During this same period, per capita income in the U.S. as a whole grew 5.0 percent, in New England grew 6.1 percent and among the EPSCoR states combined grew 6.1 percent. Maine fell behind the reference groups over a 5-year and 10-year period as well, showing only a 44 percent change.



Sources

Per capita income is from Bureau of Economic Analysis, U.S. Department of Commerce; http://www.bea.gov. All dollar estimates are in current dollars (not adjusted for inflation). Revised state personal income estimates for 2005-2007 were released September 18, 2008

Endnotes

[1] Definition of High Technology is from the U.S. Department of Commerce, based on 39 NAICS codes corresponding to high-technology industries. All employment data is based on annual average levels. The 39 industries are:

High Technology Industries NAICS Codes

NAICS Code	Industry
32411	Petroleum Refineries
3251	Basic Chemical Manufacturing
3252	Resin, Synthetic Rubber, and Artificial and Synthetic Fibers and Filaments Manufacturing
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing
3254	Pharmaceutical and Medicine Manufacturing
3255	Paint, Coating, and Adhesive Manufacturing
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing
3259	Other Chemical Product and Preparation Manufacturing
332992	Ordnance & Accessories Manufacturing—Small Arms Ammunition Manufacturing
332993	Ordnance & Accessories Manufacturing—Ammunition (except Small Arms) Manufacturing
332994	Ordnance & Accessories Manufacturing—Small Arms Manufacturing
332995	Ordnance & Accessories Manufacturing—Other Ordnance and Accessories Manufacturing
3331	Agriculture, Construction, and Mining Machinery Manufacturing
3332	Industrial Machinery Manufacturing
3333	Commercial and Service Industry Machinery Manufacturing
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing
3339	Other General Purpose Machinery Manufacturing
3341	Computer and Peripheral Equipment Manufacturing
3342	Communications Equipment Manufacturing
3343	Audio and Video Equipment Manufacturing
3344	Semiconductor and Other Electronic Component Manufacturing
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing
3346	Manufacturing and Reproducing Magnetic and Optical Media
3353	Electrical Equipment Manufacturing
33599	All Other Electrical Equipment and Component Manufacturing
3361	Motor Vehicle Manufacturing
3362	Motor Vehicle Body and Trailer Manufacturing
3363	Motor Vehicle Parts Manufacturing
3364	Aerospace Product and Parts Manufacturing
3391	Medical Equipment and Supplies Manufacturing
5112	Software Publishers
514191	On-Line Information Services
5142	Data Processing Services
5413	Architectural, Engineering, and Related Services
5415	Computer Systems Design and Related Services
5416	Management, Scientific, and Technical Consulting Services
5417	Scientific Research and Development Services
6117	Educational Support Services
811212	Computer and Office Machine Repair and Maintenance

[2] See note 1 for definition of high technology businesses.

[3] S&E occupations are defined by NSF as 77 standard occupational codes that encompass mathematical, computer, life, physical, and social scientists; engineers; and postsecondary teachers in any of these S&E fields. People with job titles such as manager are excluded.

indicators:

- Math and Science Skills of Students
- Higher Education Enrollment among Young People
- Science and Engineering Graduate Enrollments
- Science and Engineering Degrees Awarded
- Education Attainment

EDUCATION CAPACITY OVERVIEW

When asked about issues that have the greatest impact on business and economic development, business owners, economic developers, and site locators consistently rank the availability of a skilled and educated workforce as their top concern. Moreover, technology and innovation based companies require workers with advanced skills and education in math and sciences.

Success in developing math and science skills begins at the K-12 level. Maine eighth grade students continue to perform well relative to other states in math and science. Maine's average math score in 2007 on the National Assessment of Educational Progress (NAEP) placed its eighth graders 12th in the nation, up from the 2005 level of 20th. In 2005, Maine eighth graders turned in the 9th highest science scores in the country on the NAEP.

Today's science and technology intensive careers demand an education level beyond that of a high school level. In terms of advancing twelfth graders onto higher education, in 2006, Maine performed at a much higher level than previous years. In terms of college enrollment among 19 year-olds, Maine came in at the same level as New England and above both the EPSCoR States and U.S.

Supporting a vibrant technology and innovation economy requires a regular supply of workers with college and advanced degrees in science and engineering related fields. With regard to science and engineering enrollments and science and engineering degrees awarded, Maine lags the nation, New England, and EPSCoR states. Whether this is more of a demand or supply issue or both is beyond the reach of this Index. However it is clear that Maine needs to do more to increase science and engineering higher education particularly at the advanced levels.

Finally, with regard to the adult population, Maine has leveled off from a previously significant progress in improved education levels. Compared to the reference groups, Maine was the only one that saw a decrease from 2007 to 2008 on this indicator. In 2008, 26 percent of Maine's population twenty five years and older held four-year college degrees or more, down from 27 percent in 2007. In 2008, the level for the US as a whole was 29 percent, for New England, it was 35 percent, and for the EPSCoR states 25 percent.

Math and Science Skills of Students

math performance summary

Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	12

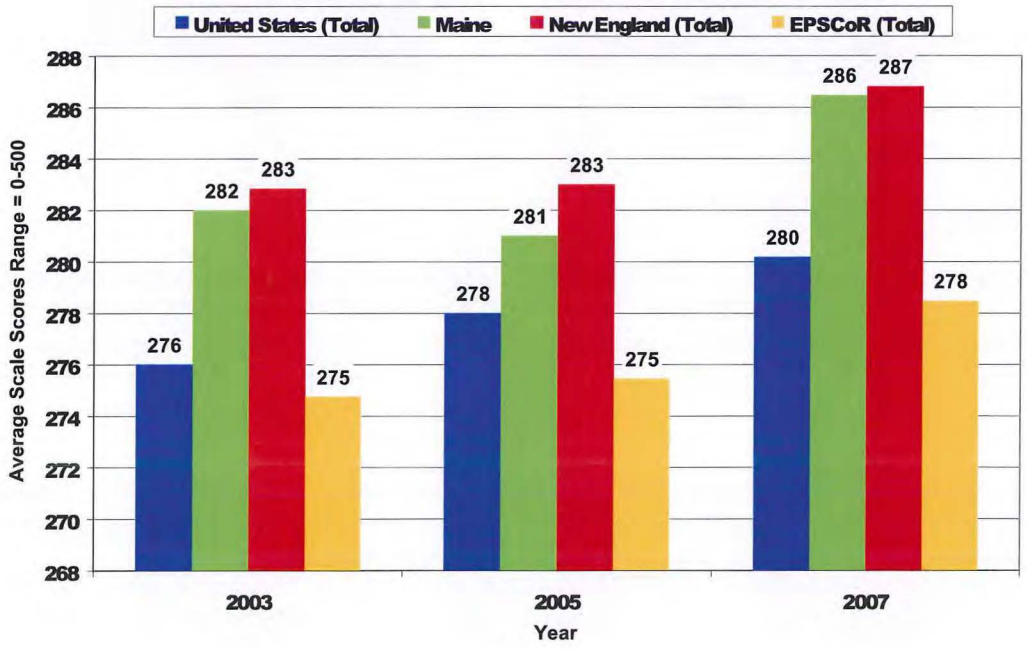
science performance summary

Maine 5-Year Trend	↔
Maine Compared to EPSCoR	↑
Maine's National Ranking	9

Summary

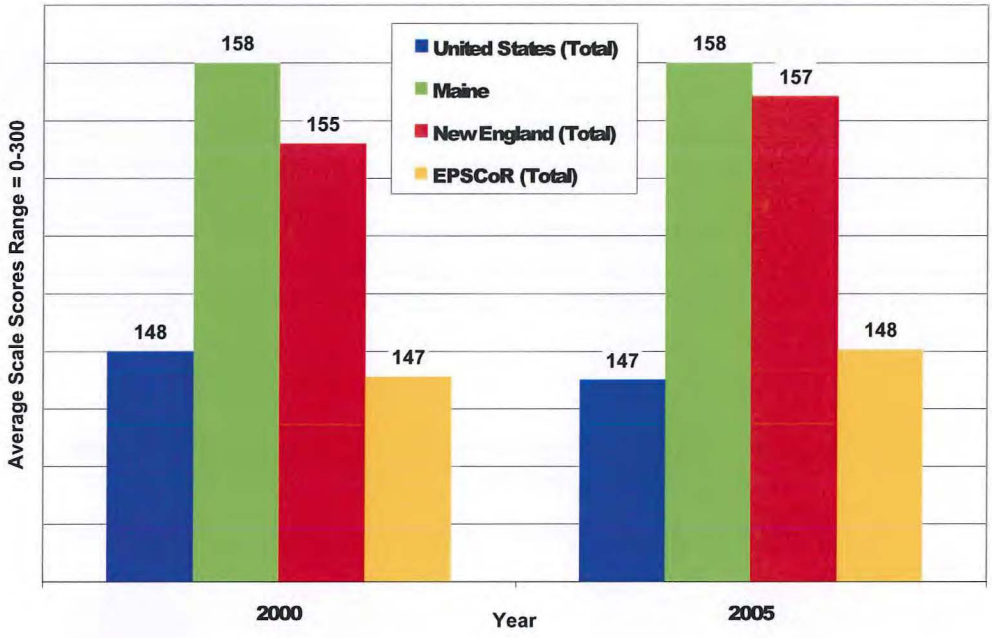
The National Assessment of Educational Progress (NAEP), provides data to allow a comparison of education achievement across states. On the 2007 NAEP mathematics test, Maine eighth graders scored 286[1]. This was higher than both 2003 (282) and 2005 (281).[2] Maine's score in 2005 placed its eighth graders at 20th in the nation; the 2007 score (286) elevated Maine students to 12th in the nation. In 2007 Maine eighth graders nearly matched the scaled score of the other New England states (287), and scored higher than the US average scaled score (280) and that of the EPSCoR states (278).

National Assessment of Educational Progress – Math Scores (Average Scale Scores) for 8th Graders – 2003, 2005, 2007



On the 2005 NAEP, Maine eighth graders turned in the ninth highest science scores in the country. Maine's average score was 158 compared to 147 for the US, 157 for New England, and 148 for the EPSCoR states.[3]

National Assessment of Educational Progress – Science Scores (Average Scale Scores) for 8th Graders – 2000 & 2005



Why This Is Significant

As technology becomes a part of most jobs, proficiency in both math and science is a fundamental requirement for especially for technology-related industries. The NEAP helps to measure performance in math and science among eighth graders in Maine and because it is conducted nationally allows comparisons among states.

Sources

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2000 & 2005 Science Assessments and 2000, 2003, 2005 and 2007 Mathematics Assessments; http://nces.ed.gov/nationsreportcard/

Higher Education Enrollment among Young People

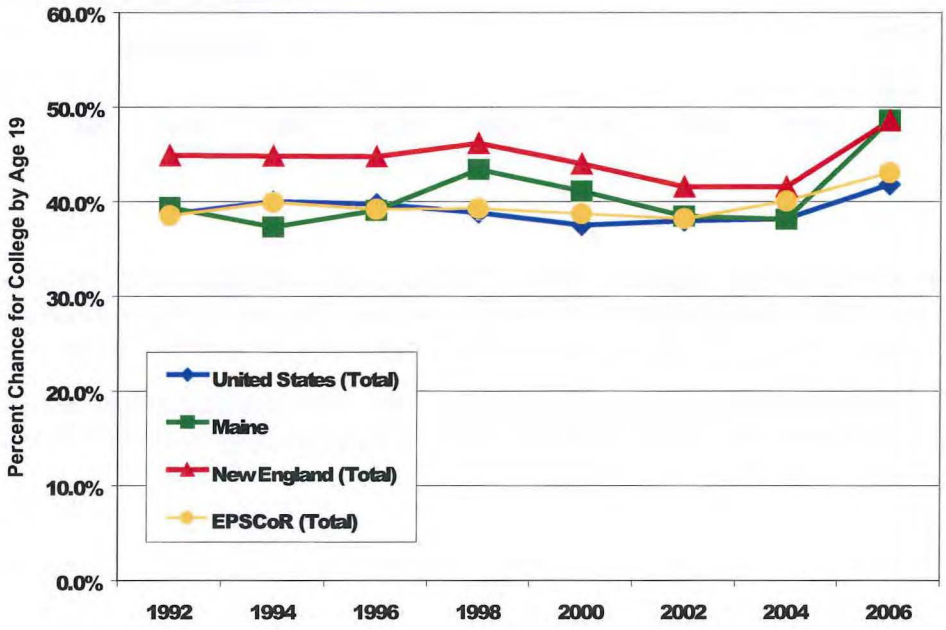
— performance summary —

Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	13

Summary

In 2006, Maine 19 year-olds had a 48.6 percent chance of being enrolled in post-secondary education. Chance for college is based on public high school graduation rates (high school graduates divided by the number of 9th grade enrollments 4 years prior) and the college continuation rate (number of fall freshman enrolled anywhere in the U.S. who were high school graduates the previous spring)[4]. This represents a 27.5 percent increase from the state's 2004 level of 38.1 percent. On this indictor in 2006, Maine performed at the same level as the New England states, but above the U.S. levels (41.8 percent) and the EPSCoR states (43.1 percent).

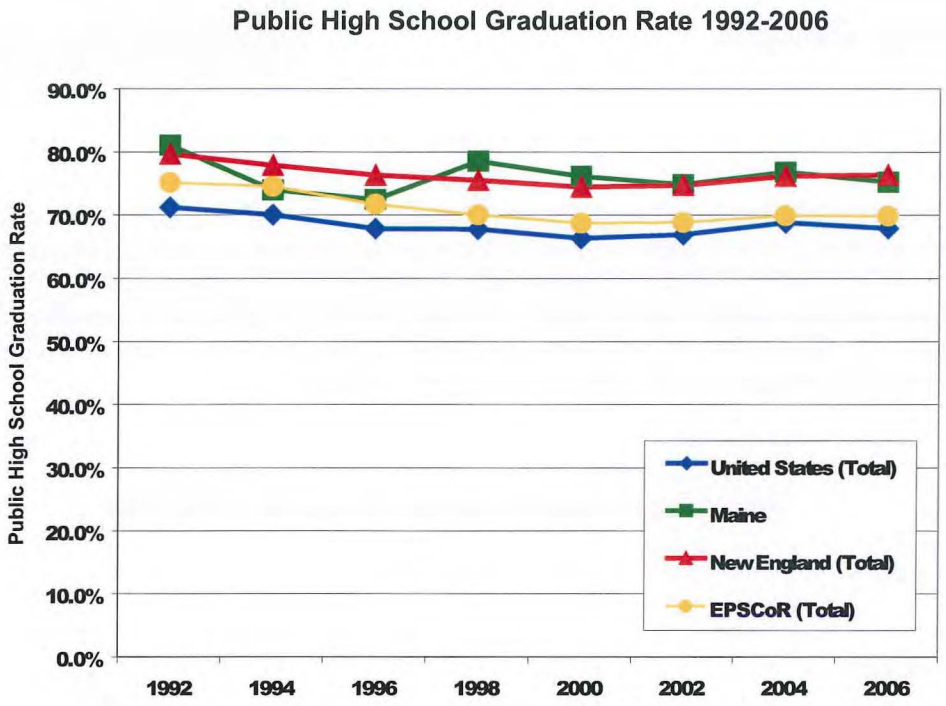
Chance for College Enrollment by Age 19 – 1992-2006



Why This Is Significant

Higher education attainment among the population is increasingly important if Maine is to develop a technology-intensive economy and one that promotes personal economic well-being. The extent to which young adults complete high school and continue to higher education is an indicator of aspirations among young adults, accessibility of higher education, and future potential education attainment.

HIGHER EDUCATION ENROLLMENT AMONG YOUNG PEOPLE

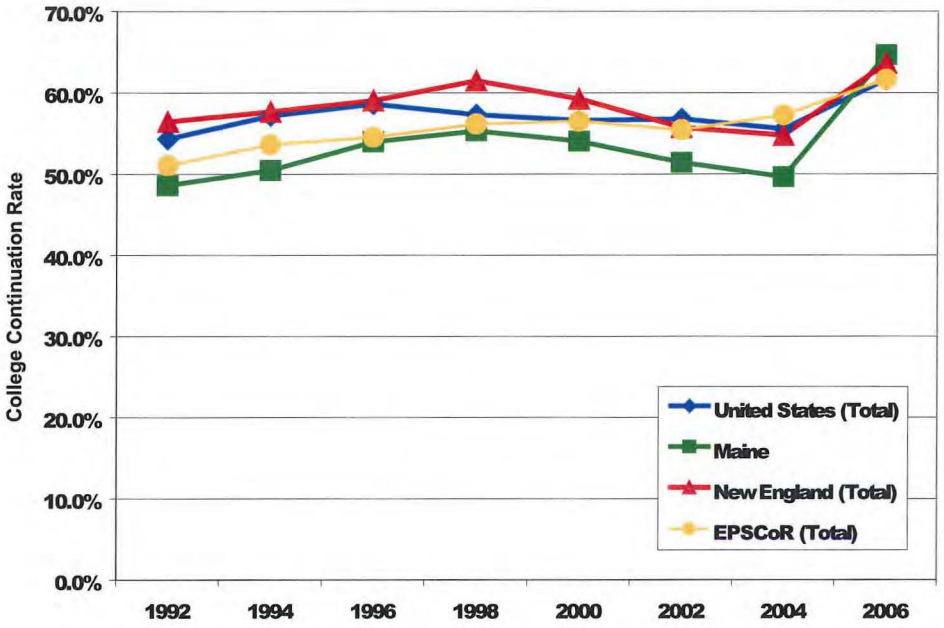


Related

Chance for college at the end of high school is a factor of both high school graduation and college continuation rates. In 2006, Maine's public high school graduation rate was 75.2 percent. This was similar to the New England average of 76.4 percent and higher than that for the U.S. as a whole (67.9 percent) and the EPSCoR states (69.9 percent).

In 2004, Maine's college continuation rate was 49.6 percent, but in 2006 it increased significantly to 64.6 percent. This moved Maine from lower than all the reference groups to being on top with the U.S. at 61.6 percent, New England at 63.6 percent, and EPSCoR at 61.6 percent.

College Continuation Rate 1992-2006



Sources

Data on chance for college is "Chance for College by Age 19 by State- 1986-2006", Thomas Mortenson, Post-secondary Education Opportunity; 9/22/2008; http://www.postsecondary.org and is based on data from data from Public Elementary and Secondary Education Statistics and the biannual Integrated Postsecondary Education Data System of the National Center for Education Statistics, www.nces.ed.gov. Data on Maine high school graduate intentions is from Maine Department of Education, "Graduates on to Post Secondary Schools, by County and Unit, Public Schools", based on survey of high school seniors in the spring of each school year in which seniors are asked to indicate if they intend to go on to postsecondary education, www.state.me.us/education/enroll/grads/gradspost.htm (data no longer collected).

Science and Engineering Graduate Enrollments

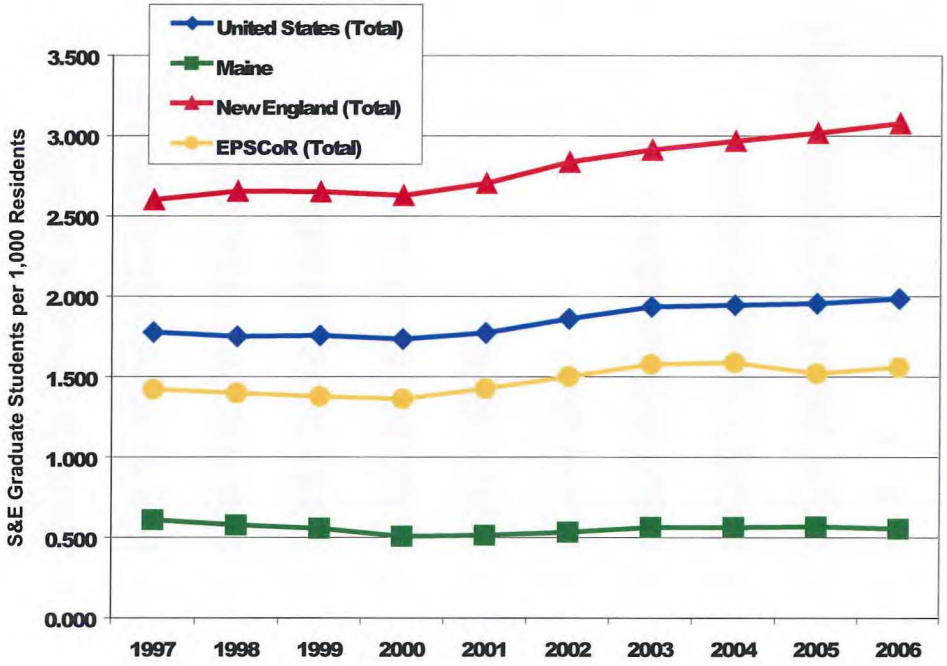
— performance summary —

Maine 1-Year Trend	↔
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	51

Summary

In 2006, Maine had 728 graduate students enrolled in science and engineering programs. This represented 0.55 enrolled graduate students per 1,000 residents. On this indicator in 2006 Maine significantly lagged the indices of the US (1.98), New England (3.08), and EPSCoR (1.56). Furthermore, the general trend line shows a slight increase over time in S&E graduate enrollments for the U.S., New England, while Maine has experienced fewer S&E graduates per 1,000 students than in 1997.

S&E Graduate Student Enrollments per 1,000 Residents – 1997-2006



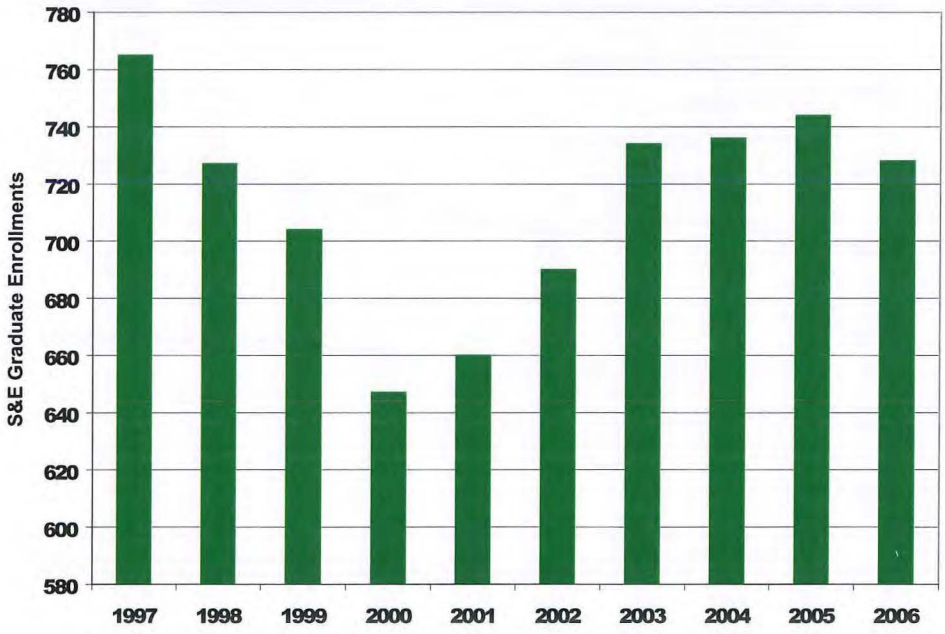
Why This Is Significant

The extent to which Maine colleges and universities are awarding science and engineering degrees is an indicator of both the science and technical capacity of the state's postsecondary schools and the potential for workers with science and technical abilities among Maine's workforce. Both of these are fundamental requirements for developing a solid foundation for research and long-term, technology-driven innovation. The National Science Foundation, the National Institutes of Health, and the Council of Graduate Schools also emphasize the importance of graduate level studies in these disciplines: "The goal that national science workforce policy seeks or needs to maximize is to produce high quality researchers as quickly and cheaply as possible. [It] emphasized that graduates enrolled in science and engineering fields more than those enrolled in other disciplines would likely remain connected to their chosen field: Most master's recipients [in science and engineering disciplines] were continuing in science and engineering-related employment or education…and those recipients with the highest GPAs were much more likely than other master's recipients to stay in science and engineering fields."[5].

Related

Maine colleges and universities were host to 728 students who were pursuing graduate degrees in science and engineering disciplines in 2006. Although this was an increase since 2002, it demonstrated a significant decrease in such students since 1997 when 765 students studied graduate level degrees in science and engineering disciplines and has declined from the 2005 enrollment number of 744. Enrollment since 1997 shows that all three other comparative units (US, New England, and EPSCoR) succeeded in increasing the enrollment of students in science and engineering graduate degrees while Maine's enrollment decreased by 4.8 percent.

S&E Graduate Enrollments in Maine – 1997-2006



Sources

S&E Graduate Students - NSF WebCASPAR Database System based on "Survey of Graduate Students and Postdoctorates in Science and Engineering", National Science Foundation and National Institutes of Health; http://webcaspar.nsf.gov. Population for 1990-1999 - Table CO-EST2001-12-00 - Time Series of Intercensal State Population Estimates: April 1, 1990 to April 1, 2000; Population Division, U.S. Census Bureau; Release Date: April 11, 2002; July 2000-July 2006 -Table 1: Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2007 (NST-EST2007-alldata), Population Division, U.S. Census Bureau, Release Date: August 18, 2008; www.census.gov/popest/estimates.php

Science and Engineering Degrees Awarded

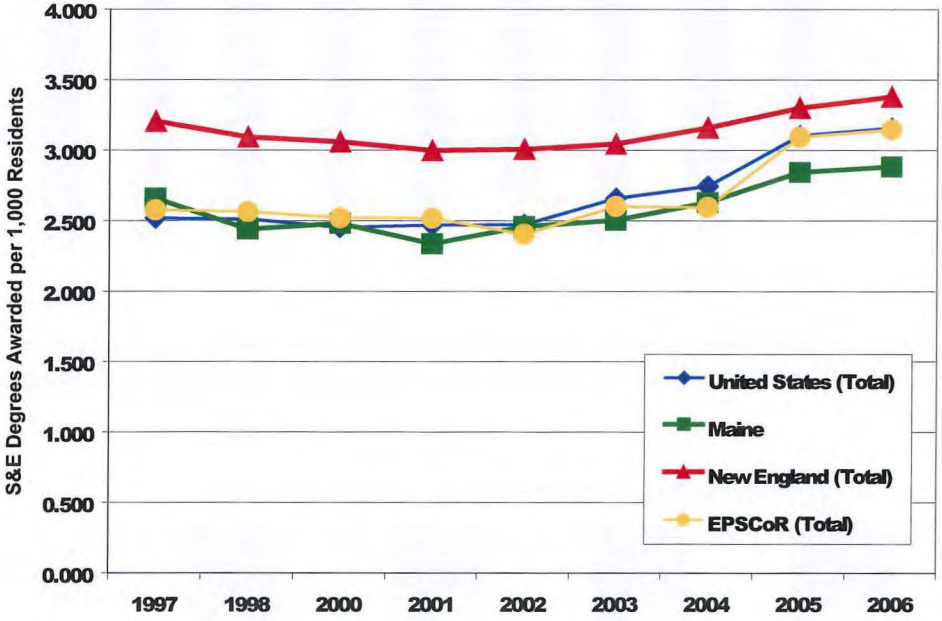
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	38

Summary

In 2006, Maine colleges and universities awarded 3,731 degrees[6] in science and engineering disciplines. This represented 2.88 science and engineering degrees per 1,000 Maine residents. In 2006, Maine's level on this indicator was lower than the national level of 3.16, the New England level of 3.38, and the EPSCoR level of 3.15.

S&E Degrees Awarded per 1,000 Residents – 1997-2006



Note: 1999 data is unavailable

Why This Is Significant

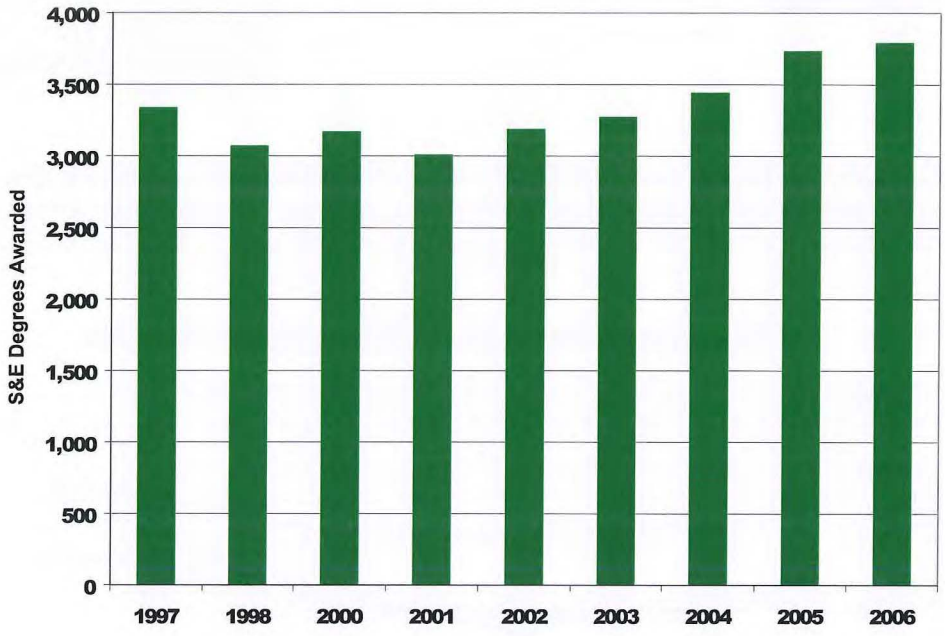
The extent to which Maine colleges and universities are awarding science and engineering degrees is an indicator of both the science and technical capacity of the state's postsecondary schools and the potential for workers with science and technical abilities among Maine's workforce. Both of these are fundamental requirements for developing a solid foundation for research and long-term, technology-driven innovation.

Related

Of the 3,731 science and engineering degrees awarded in Maine in 2006, 593, or 15.6 percent, were masters degrees or higher. The growing importance of advanced degrees was reflected in the award trend data: the number of graduate degrees (masters or higher) awarded in science and technology has increased steadily from a level of 12.6 percent in 1997.

SCIENCE AND ENGINEERING DEGREES AWARDED

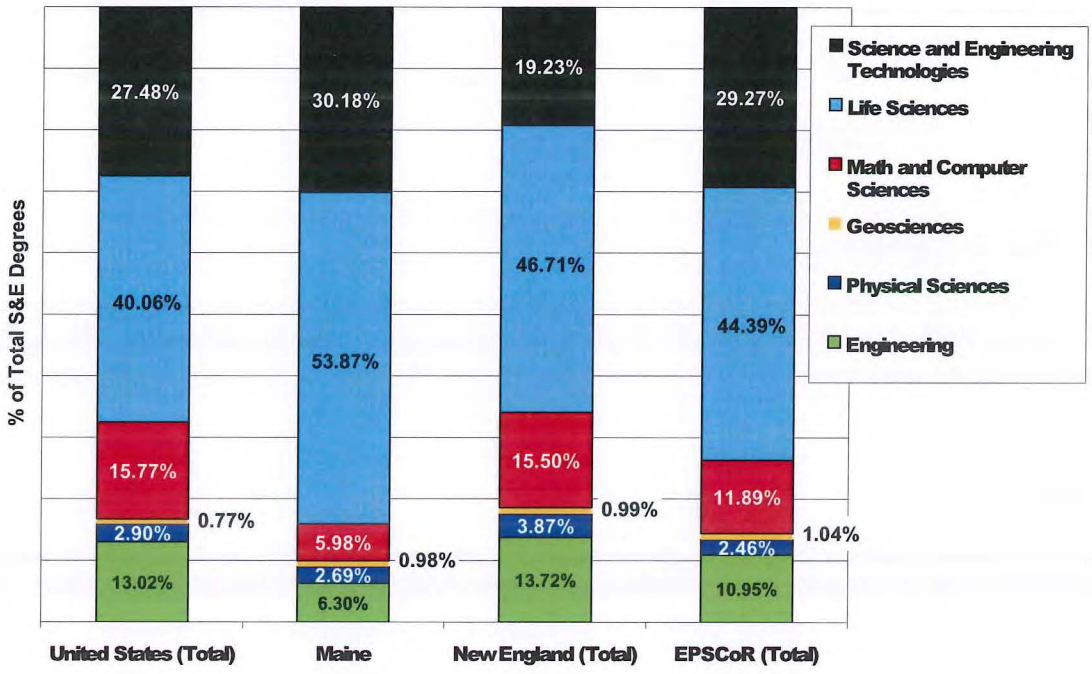
S&E Degrees Awarded in Maine – 1997-2006



Note: 1999 data is unavailable

In terms of the academic disciplines in which degrees were awarded by Maine and the U.S. in 2006, compared to the U.S. Maine had a higher concentration in life sciences and lower concentrations in engineering, math and computer sciences.

Science & Engineering Degrees by Discipline – 2005



Sources

S&E degrees awarded were extracted from NSF WebCASPAR Database System, http://webcaspar.nsf.gov, based on the Higher Education General Information Survey and Integrated Post-Secondary Education Data System, National Center for Education Statistics, U.S. Department of Education, www.nces.ed.gov. (Data for 1999 was unavailable.) Population for 1990-1999 - Table CO-EST2001-12-00 - Time Series of Intercensal State Population Estimates: April 1, 1990 to April 1, 2000; Population Division, U.S. Census Bureau; Release Date: April 11, 2002; July 2000-July 2006 -Table 1: Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2007 (NST-EST2007-alldata), Population Division, U.S. Census Bureau, Release Date: August 18, 2008; http://www.census.gov/popest/estimates.php

Education Attainment

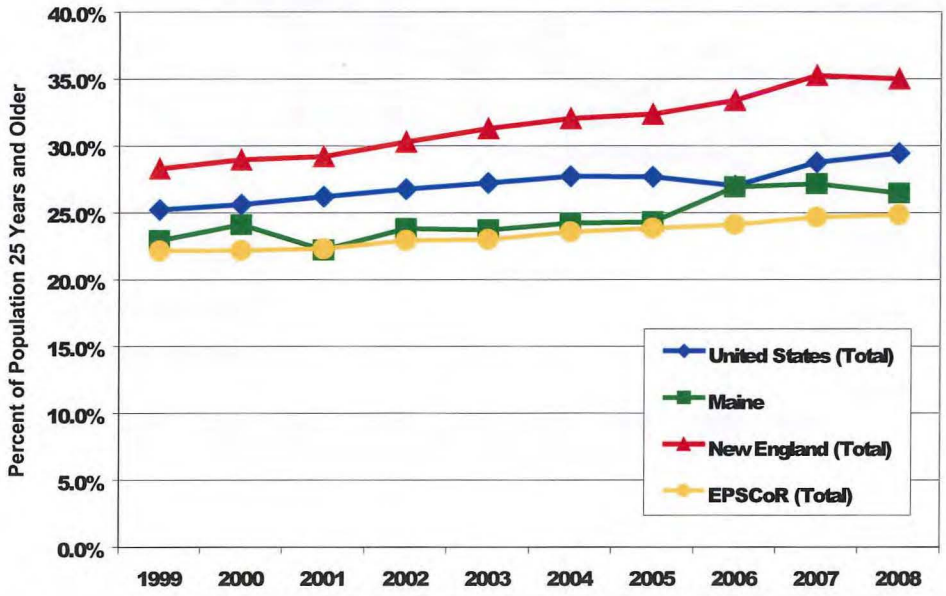
— performance summary —

Maine 1-Year Trend	↓
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	33

Summary

Maine has started to slip on this indicator, after years of steady progress and increases. Compared to the reference groups, Maine was the only one that saw an increase from 2005 to 2006 on this indicator. Since then it has since seen a decline. In 2008, 26.4 percent of Maine's population twenty five years and older held four-year college degrees or more, down from 27 percent in 2007. In 2008, the level for the US as a whole was 29.4 percent, for New England, it was 35 percent, and for the EPSCoR states, 24.8 percent.

Percent of Population 25 Years and Older Who Have a Bachelors Degree or More 1999-2008



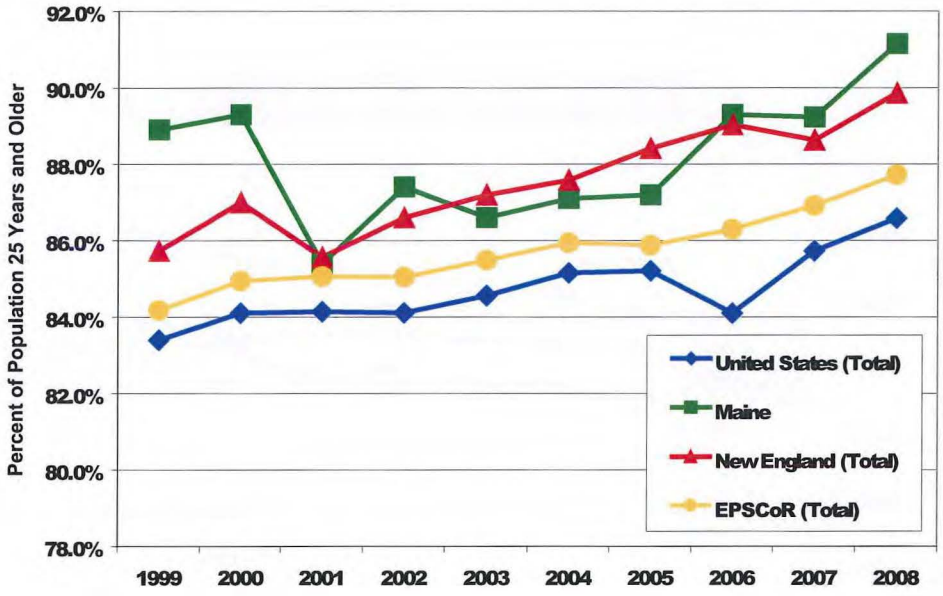
Why This Is Significant

Analysis conducted by the Maine State Planning Office as part of *30/1000 Initiative* reveals that the economic well-being of a state is strongly tied to two factors: (1) the percent of the population with a bachelor's degree or higher, and (2) the level of expenditures for research and development. This analysis is supported by national research.[7] Wages are typically higher in technology-intensive industries; these are the same industries that increasingly require workers with higher education degrees. In terms of income of the average person, income levels are considerably higher for persons with college and advanced degrees.

Related

In terms of the percentage of the population 25 years and older who have graduated from high school, in 2006 Maine ranks 18th among all states. Maine's percentage of 89.3 percent placed Maine higher than the nation as a whole (84.1 percent), higher than the EPSCoR states (86.3 percent), and slightly higher than the New England states (89.0 percent).

Percent of Population 25 Years and Older That Have Completed High School 1999-2008



Sources

Education Attainment data is from U.S. Census Bureau, Current Population Survey U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement; http://www.census.gov/hhes/www/income/histinc/p16.html

Endnotes

[1] Math scale scores range from 0-500.

[2] Accommodations are permitted in 2000 and beyond. Accommodations are related to assessing students with disabilities and/or students for whom English is not their first language. For 1996 and prior, no accommodations were permitted.

[3] Science scale scores range from 0-300.

[4] Chance for college by age 19 is calculated by the Mortenson Research Seminar on Public Policy Analysis of Opportunity for Postsecondary Education and equals the product of the public high school graduation rate and the college continuation rate. Public high school graduation rate equals high school graduates divided by the number of 9th grade enrollments 4 years prior, data is based on "Public Elementary and Secondary Education Statistics", National Center for Education Statistics, www.nces.ed.gov. College continuation rate equals the number of fall freshman enrolled anywhere in the U.S. who were high school graduates the previous spring. The data is from the biannual Integrated Postsecondary Education Data System, National Center for Education Statistics, www.nces.ed.gov.

[5] National Science Board, *HER Task Force on National Workforce Policies for Science and Engineering,* NSB/HER/NWP 00-4, December 13, 2000. /documents/2000/nwp004/nwp004.htm

[6] Degrees and awards earned but not yet conferred by branch institutions located in foreign countries, and of an honorary nature are not included; Includes the science fields of engineering, physical sciences, geosciences, math and computer sciences, life sciences, medical sciences, and science and engineering technologies; Excludes psychology, social sciences, and interdisciplinary sciences; Includes associate's, bachelor's, master's, first professional, and doctorate level degrees and certificates

[7] The Mortenson Research Seminar on Public Policy Analysis of Opportunity for Postsecondary Education, www.postsecondary.org for further analysis on this subject.

indicators:

- Household Connectivity
- High Speed Internet Access
- Classroom Connectivity

CONNECTIVITY CAPACITY OVERVIEW

The Internet has transformed every segment of society, from families to schools to businesses, from communities to states and nations. The ability to use the Internet represents the ability to connect, communicate, and participate directly in innovation. In today's digital economy, broadband access is becoming as important to business success as more traditional infrastructure such as roads and water and sewer facilities.

Maine's experience with connectivity varies. Relative to the U.S. as a whole and the EPSCoR states, Maine households have higher access to the Internet. However in terms of high speed access, Maine has fewer high speed Internet lines per 1,000 residents than its U.S. and New England counterparts.

In terms of classroom connectivity, fueled by the laptop initiative and local and state investments in technology, Maine continues to be a leader with more Internet computers per student and greater use of computers and the Internet by teachers compared to the reference groups.

Household Connectivity

— Performance Summary —

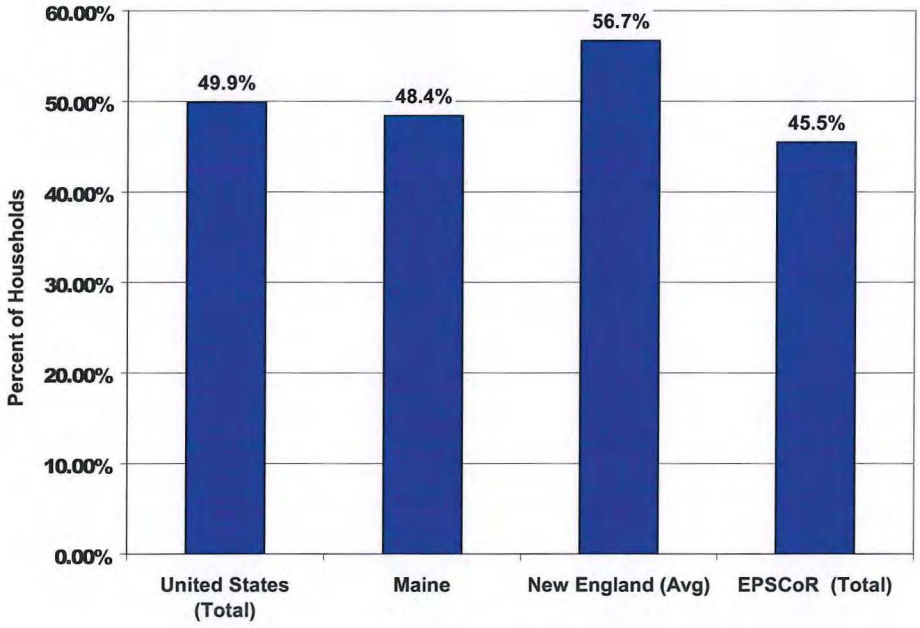
Maine Compared to EPSCoR ↑

Maine's National Ranking **30**

Summary

In 2007, 48.4 percent of Maine households had broadband access to the Internet. Maine was behind New England (56.7 percent) and the U.S. as a whole (49.9 percent) but had a higher percentage than the EPSCoR states (45.5 percent)[1].

Percent of Households With Broadband Internet Access – 2007



Why This Is Significant

Household Internet access provides citizens with the opportunity to utilize the Internet for business, education, and personal uses 24 hours a day. The Internet is gaining increasing significance as a means of information exchange, communications, business transactions and research. This indicator measures the ease with which Maine citizens can access this information tool compared to the rest of the nation.

Sources

Households Online: U.S. Department of Commerce, National Telecommunications andInformation Administration, Networked Nation: Broadband in America 2007 (2008). www.ntia.doc.gov/reports/2008/NetworkedNation.html

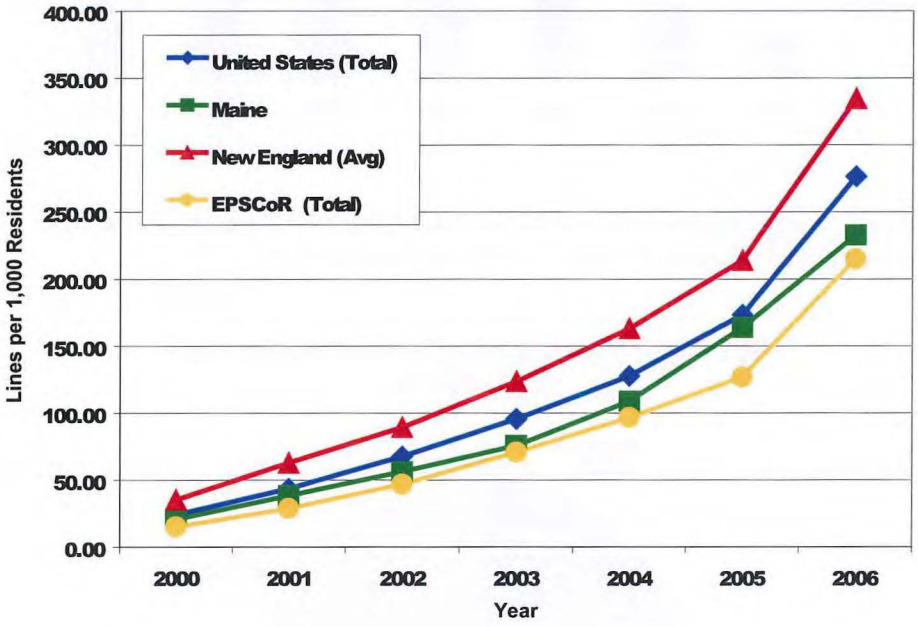
High Speed Internet Access

— Performance Summary —	
Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	37

Summary

Maine has seen a significant increase in broadband[2] Internet subscribers,[3] from 17,864 in 2000 to 305,883 in 2006. This represented an increase of 1,065 percent. However, relative to the U.S. and New England, Maine had fewer subscribers per 1,000 residents. In 2006, there were 231 Internet lines per 1,000 residents in Maine compared to 276 in the U.S. as a whole and 334 in New England. During the same year Maine was higher than the EPSCoR level of 214 lines per 1,000 residents.

High Speed Internet Lines (Subscribers) per 1,000 Residents 2000-2006



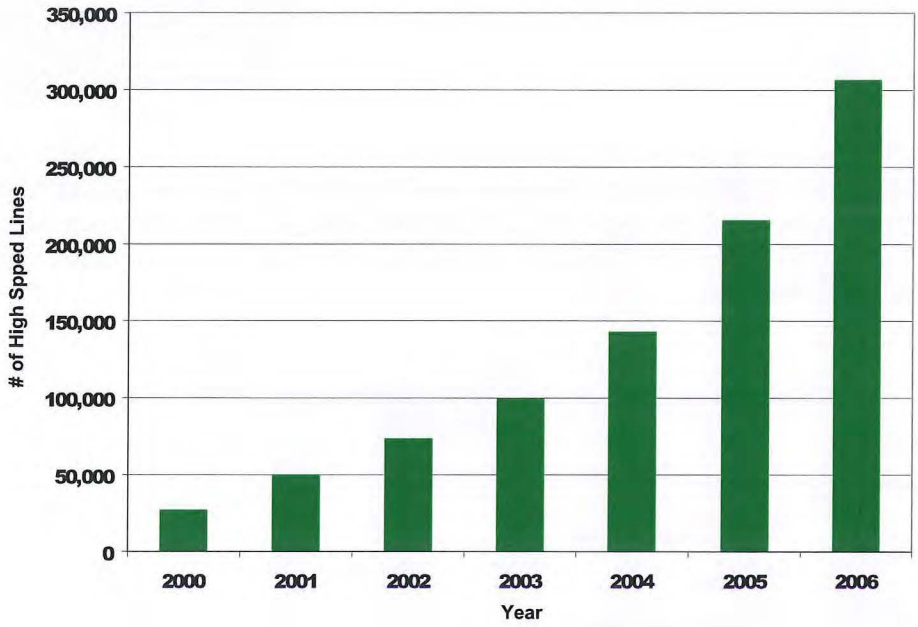
Why This Is Significant

The degree to which broadband technology is available and used in Maine determines, to a significant extent, the degree to which Maine is technologically competitive. For instance, companies that rely on e-commerce for sales transactions, require broadband technology. Likewise, entities engaged in research and development require high capacity communications technology. Moreover, the rise of Internet video and other technologies, including both consumer uses and business tools, places more demand on Internet traffic. Using these new tools and technologies is almost impossible without broadband access.

According to the American Electronics Association, an organization of more than 3,000 companies engaged in aspects of high technology, "Widespread broadband deployment will have a positive effect on many areas of everyday life, ranging from communications, entertainment, and healthcare to education and job training."

HIGH SPEED INTERNET ACCESS

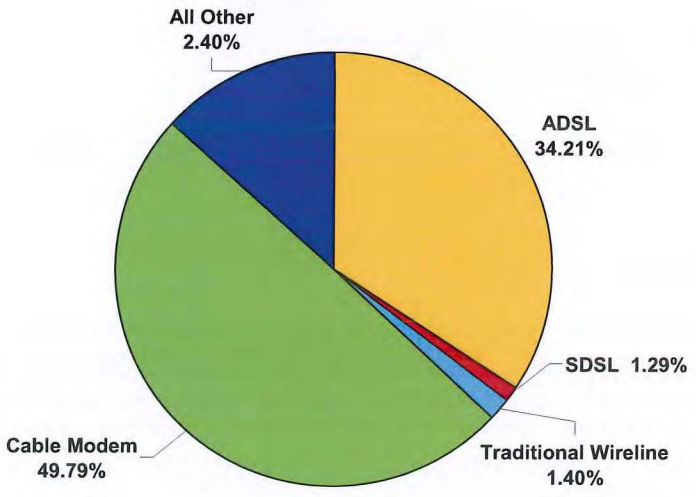
High Speed Internet Lines (Subscribers) in Maine – 2000-2006



Related

In terms of the method of high speed Internet access used in Maine, in 2006 cable is dominant with 50 percent of high speed lines compared to 35 percent for digital subscriber lines (DSL)[4].

High Speed Internet Lines (Subscribers) by Type
2006 – Maine



Total Lines (Subscribers) = 305,883

Source

Internet line data is from "High-Speed Services for Internet Access: Status as of December 31, 2006", October 2007, Federal Communications Commission; http://www.fcc.gov/wcb/iatd/comp.html.

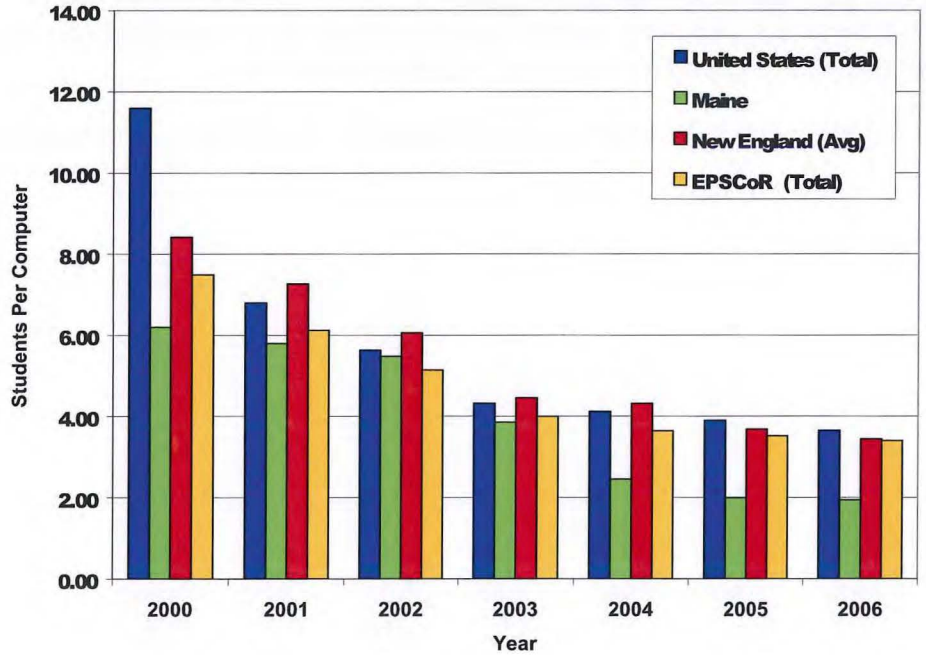
Classroom Connectivity

— Performance Summary —	
Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	2

Summary

Maine continues to be a leader with regard to access to computers and the Internet in the classroom. In 2006, there were 1.94 students per Internet connected computer in Maine compared to 3.65 in the U.S. as a whole, 3.44 in New England, and 3.40 among EPSCoR states[5]. Maine's program to provide a laptop to every 7th grade student made it one of a few states in the nation with classroom laptop programs.

K-12 Students Per Internet Connected Computer – 2000-2006



Why This Is Significant

The Internet provides access to research and information that can enhance classroom curriculum at every grade level. Easy access to Internet-connected computers is needed for teachers to effectively incorporate information technologies into the learning environment. Computer literacy is increasingly becoming a minimum requirement of employers.

Sources

Student to computer ratios are from Technology Counts 2000-2006, Education Week; http://edweek.org

Endnotes

[1] Source data for this indicator changed in the latest year so historical trends are not available.

[2] "Broadband" is defined as high-speed data lines that provide the subscriber with data transmissions at speeds in excess of 200 kilobits per second (kbps) in at least one direction.

[3] "Subscriber" is equivalent to a line in service. An active line may have one or more users.

[4] The mutually exclusive types of technology are, respectively: Asymmetric digital subscriber line (ADSL) technologies, which provide speeds in one direction greater than speeds in the other direction; symmetric digital subscriber line (SDSL) technologies; traditional wire line technologies "other" than ADSL and SDSL, including traditional telephone company high-speed services that provide equivalent functionality; cable modem, including the typical hybrid fiber-coax (HFC) architecture of upgraded cable TV systems; optical fiber to the subscriber's premises (e.g., Fiber-to-the-Home, or FTTH); satellite and fixed and mobile terrestrial wireless systems, which use radio spectrum to communicate with a radio transmitter; and electric power line.

[5] In 2005, indicator was changed from "internet" connected computer to "high-speed internet" connected computer

About PolicyOne Research

Since 2003, PolicyOne has annually produced Maine's Innovation Index and managed Maine's Evaluation of State Investments in Research and Development. PolicyOne provides clients with a full range of services within the areas of economic and community development, science and technology based economic development, program and service evaluation, state and local government fiscal analysis, and survey design and analysis (including PolicyOne's own online survey system).

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